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## ABSTRACT

This book is a collection of more than 80 instructional units designed to help educators develop, modify, and expand their agricultural education curriculum in middle school, junior high, and high school. These units, developed and field tested by Wisconsin agriculture educators, expand upon the curriculum model presented in the Wisconsin Department of Public Instruction's guide. The units are based on the following seven employment clusters: (1) agriculture science/production management; (2) agriculture processing/food and fiber; (3) agriculture marketing/distribution and retailing services; (4) agriculture supplies and services; (5) agriculture mechanization/engineering and technical support services; (6) agriculture resources management; and (7) professional employment in agriculture. Units consist of a short description, time estimate, objectives, competencies, subject matter, and lists of motivational activities, learning activities, instructional materials, and equipment and facilities. In addition, the guide offers several instructional units under a "cross-cluster" category--applicable to two or more of the employment clusters. The guide also shows how the employment clusters fit into Wisconsin's curriculum for various areas of agriculture education. Appendices include names and addresses of publishers of instructional resources and a 12-page bibliography of agricultural periodicals. (KC)

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# **Instruction for Food and Fiber and Natural Resources**



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## Foreword

Agriculture in the United States has changed significantly in the past century with the increased efficiency of farmers and ranchers in producing food and other agricultural goods. Not only are fewer people involved in raising crops and livestock, American agricultural commodities and products are finding their way into more and more foreign and domestic markets. In addition, science, engineering, business, communication, and natural resources play a strong and expanding role in the agriculture industry.

As agriculture evolves and an increasing number of students with urban and nonfarm backgrounds become involved in agriculture education, the Wisconsin Department of Public Instruction took the lead in providing *A Guide to Curriculum Planning in Agriculture Education* to help educators keep pace with the rapidly changing agriculture industry.

Now, educators have a new resource with *Instruction for Food and Fiber and Natural Resources*. This book is a collection of instructional units designed to help educators develop, modify, and expand their agriculture education curriculum. These units, developed and field tested by Wisconsin agriculture educators, expand upon the curriculum model presented in the DPI's guide.

Teachers of agriculture education can adapt these instructional units to fit their district's unique needs and concerns. In addition, this publication offers suggestions for motivational classroom instruction, hands-on laboratory experiences, and supervised experience programs that will inspire and reinforce secondary students' interest in agriculture.

As the food and fiber industry endeavors to meet increasing, worldwide demand for affordable, high-quality products, let us give our students the encouragement and opportunities they need to prepare for this important challenge.

Herbert J. Grover  
State Superintendent



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## Introduction

Agriculture is America's largest and most basic industry. Of the more than 100 million people in the U.S. labor force, about 22 million are employed in more than 200 agriculture-related occupations. Of those 22 million, less than 2 percent are engaged directly in production agriculture.

In the Midwest, an even greater share of the work force, 34 percent, is employed in agriculture. Therefore, agriculture education is justifiably a part of Wisconsin's educational efforts at all levels, from kindergarten through postsecondary education. The Wisconsin Department of Public Instruction demonstrates its support for a comprehensive K-12 initiative in its publication, *A Guide to Curriculum Planning in Agriculture Education*.

*Instruction for Food and Fiber and Natural Resources* fine tunes this initiative even further by focusing on curriculum development in agriculture education programs for middle/junior high and high schools.

This publication provides more than 80 instructional units for agriculture education based on the following seven employment clusters, which are described in the DPI's curriculum guide:

- Agriculture Science/Production Management
- Agriculture Processing/Food and Fiber
- Agriculture Marketing/Distribution and Retailing Services
- Agriculture Supplies and Services
- Agriculture Mechanization/Engineering and Technical Support Services
- Agriculture Resources Management
- Professional Employment in Agriculture

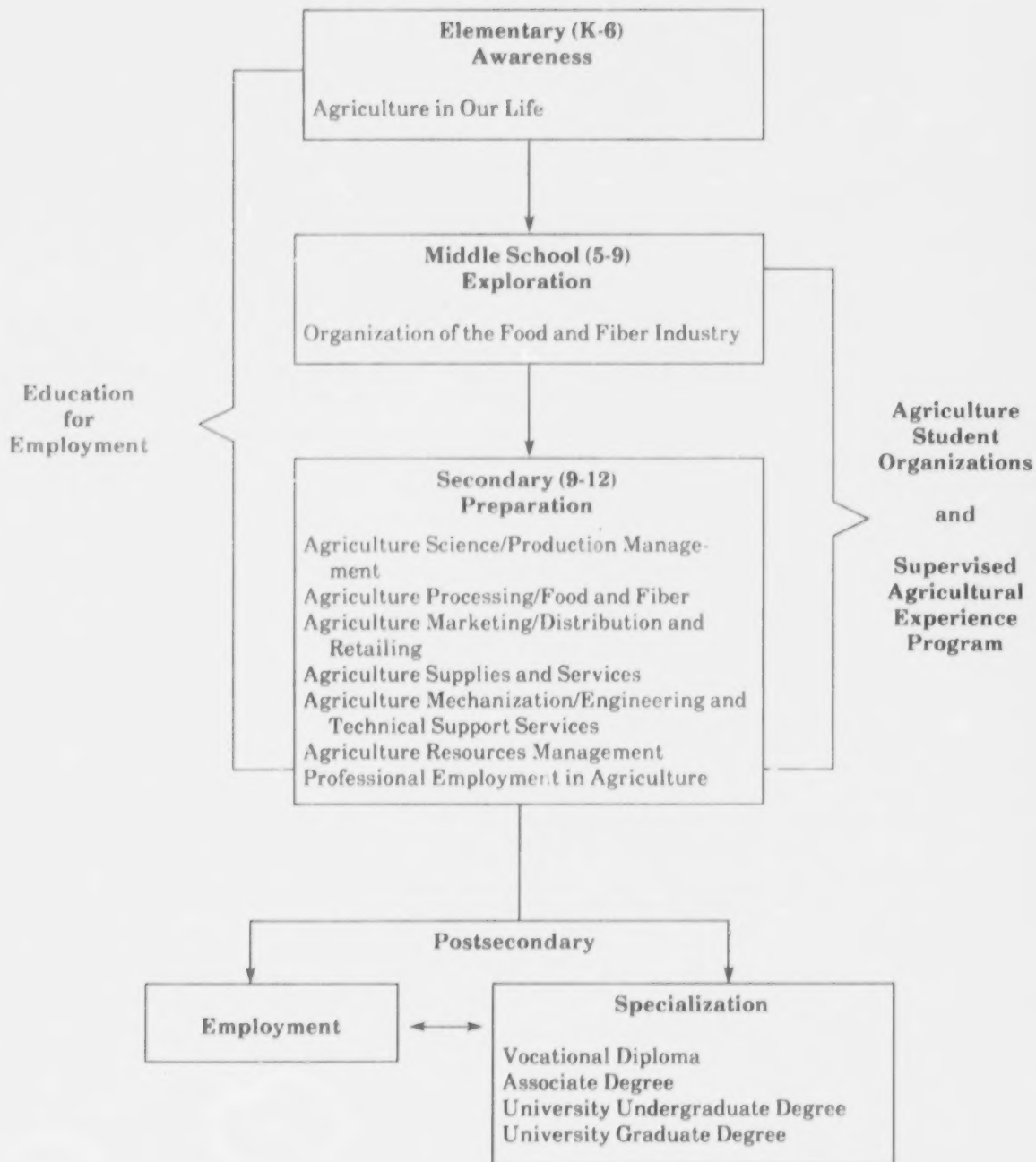
In addition, *Instruction for Food and Fiber and Natural Resources* offers several instructional units under a "Cross-Cluster" category; these units are applicable to two or more of the employment clusters.

Figure 1 depicts how the employment clusters fit into Wisconsin's curriculum model for agriculture education. The curriculum model is discussed in Section 3 of the DPI curriculum guide.

By using this framework, agriculture education teachers can provide their students with extensive, up-to-date, and practical knowledge of the food and fiber industry and the resources that support it.

■ Figure 1

## Curriculum Model



## *Integrating the Instructional Units into the Curriculum*

Traditionally, a district's agriculture education curriculum often focused solely on the agricultural needs and concerns of the community. However, today's agricultural industry operates on a global scale, and the local program should reflect that scope. Its curriculum needs to reach beyond the borders of the school district into the national and international arena.

As educators develop or modify the local agriculture education curriculum, they need to keep in mind student needs; labor market needs; current and projected facilities; administrative support, including funding; and the expertise and preferences of the agriculture education instructor(s).

However, in restructuring the local program, educators should retain two common elements of agriculture education, they are

- a one- or two-year core of semester-long introductory courses, followed by
- several one-semester advanced courses.

Another feature in agriculture education to be preserved in the local curriculum is "learning by doing." Educators can promote this concept in their agriculture education curriculums by incorporating a balance of the following three interdependent, complementary, and essential components:

- classroom and laboratory instruction,
- Supervised Agricultural Experience (SAE) programs, and
- FFA Organization activities.

Figure 2 illustrates the concept of introductory and advanced courses as well as how these components fit into a comprehensive agriculture education curriculum.

The instructional units in this publication were designed to address the above concerns in developing an agriculture education curriculum for middle/junior and high school students. The wide scope of the units can help teachers address far-reaching issues in agriculture as well as local needs and concerns. Educators also can use the units to customize courses to meet the needs of beginning and advanced students.

In addition, the instructional units give teachers ideas on how to incorporate SAE programs and FFA activities into their classroom instruction and laboratory exercises. Finally, the units provide educators with opportunities to infuse science, mathematics, social studies and communication skills into their curriculum to help their students fulfill high school graduation and college admission requirements.

### **Guidelines for Using the Instructional Units**

The instructional units, while presented in alphabetical order in the text, have been categorized into the employment clusters identified in *The Guide to Curriculum Planning in Agriculture Education* (see Chart 1). The units can be incorporated into the district's agriculture education curriculum as is or modified to conform to local needs and conditions. They also can be used to design courses of different length—such as nine-week, semester, or year-long—and at introductory and advanced levels of study.

Tables 1 through 7 present major topics and instructional concerns for each employment cluster. Educators may wish to add or drop topics or instructional concerns as they develop their local agriculture education curriculum.

This publication's loose-leaf, three-hole punch format allows agriculture teachers to assemble the instructional units they need to prepare a course of study. Each unit, developed and field tested by Wisconsin agriculture teachers, consists of

- a description;
- objectives;
- student competencies;
- subject matter to teach;
- motivational activities, which the instructor may implement;
- learning activities, which students may do; and
- a list of multimedia instructional resources, including printed materials, computer resources, and audiovisuals.

The appendixes list suppliers' addresses and other pertinent information for the instructional materials presented in the units. Appendix A provides information for text and reference books, bulletins and pamphlets, computer software, on-line computer networks, audiovisual materials, and laboratory resources. Appendix B lists the publishers of periodicals mentioned in the units. Refer to them when ordering instructional materials.

The following example describes how to design a course of study for a one-semester, 0.5-credit course for grades 11 and 12 titled "Dairy and Livestock Processing and Marketing."

**Step 1: Identify the employment cluster(s) the course will address.**

For the example course, the appropriate employment clusters would be "Agriculture Processing/Food and Fiber" and "Agriculture Marketing/Distribution and Retail Services."

**Step 2: Identify the topics of study by using the tables that correspond to the employment clusters identified in Step 1.**

The appropriate topics to select from Table 2 (Agriculture Processing/Food and Fiber) and Table 3 (Agriculture Marketing/Distribution and Retail Services) are as follows:

- Career Opportunities
- Processing the Basic Food Groups
- Related Processing Activities
- Structure and Function of the Agricultural Marketing Industry
- Determining the Price of Food and Fiber
- Administration and Supervision of Agricultural Marketing

**Step 3: Select the instructional units (see Chart 1) appropriate for the course using the topics of study identified in Step 2.**

The instructional units that best serve the topics identified in Step 2 are Dairy Products Manufacturing, Dairy Marketing, Livestock Marketing, and Meat Processing.

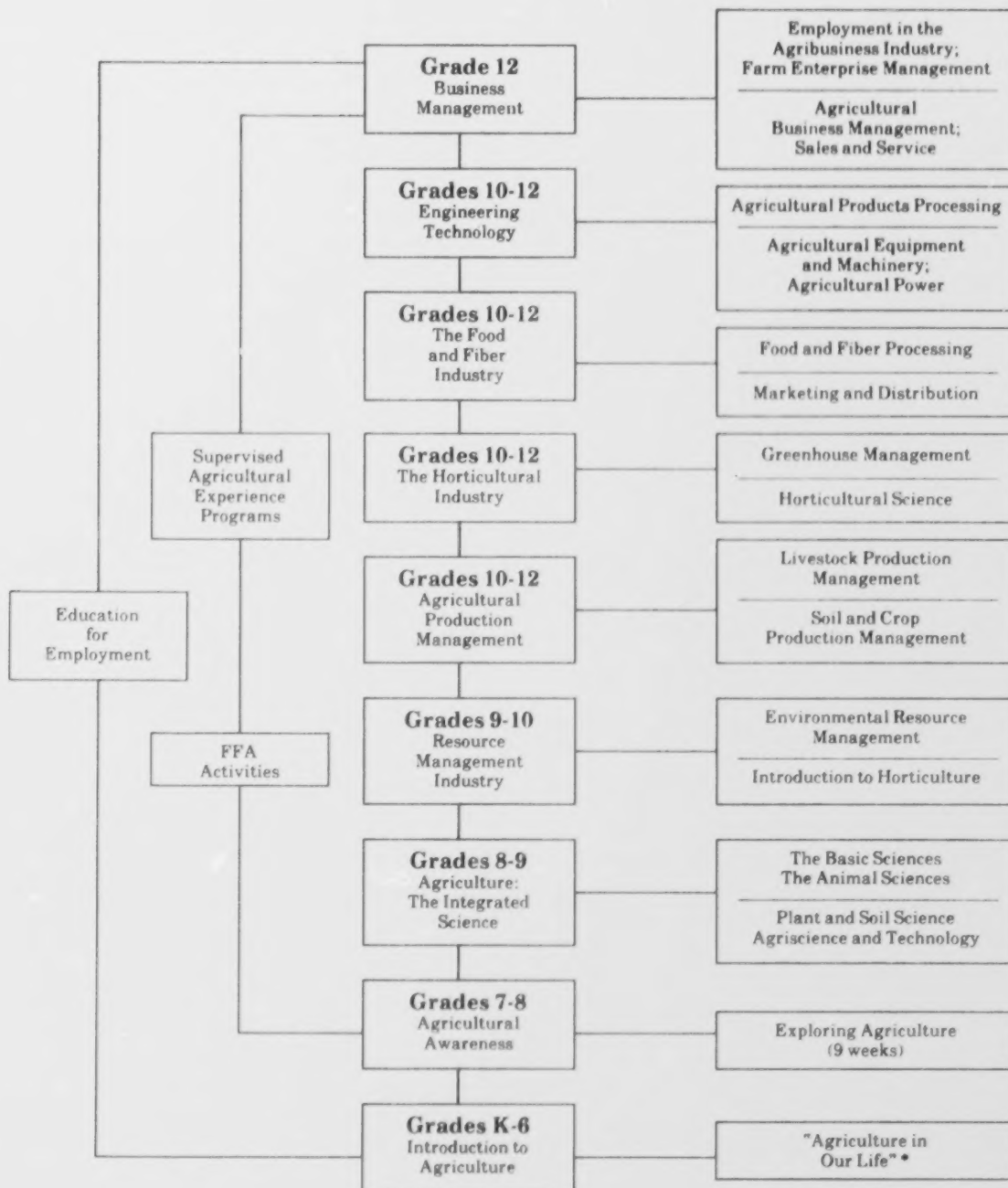
**Step 4: Read through the instructional units selected in Step 3.**

If necessary, modify the units to fit into the district's agriculture education curriculum. For example, you may want to add to or drop some of the unit's objectives, student competencies, subject matter, or motivational and learning activities. Or, you may want to add some favorite instructional materials or locally identified objectives not included in the prepared unit.



Figure 2

## Sample Curriculum for a Comprehensive K-12 Agriculture Education Program



\*Instructional Materials available from the Wisconsin Agri-Business Council and the Wisconsin Farm Bureau Federation.

## Employment Clusters and Related Instructional Units

| Employment Clusters                       | Instructional Units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agriculture Science/Production Management | Animal Nutrition<br>Aquaculture<br>Beef Cattle Science<br>Beekeeping<br>Corn Science<br>Dairy Goat Science<br>Dairy Herd Testing<br>Dairy Science<br>Floriculture Science<br>Forages—Legume<br>Forages—Nonlegume<br>Fruit Science<br>Gardening<br>Ginseng<br>Greenhouse Management<br>Horse Science<br>Horticultural Science<br>Livestock Reproduction and Artificial Insemination<br>Livestock Selection and Evaluation<br>Ornamental Nursery Management<br>Pasture Management<br>Plant Science<br>Poultry Science<br>Sheep Science<br>Small-Animal Health Care<br>Small-Animal Management<br>Small Grains<br>Soil Science—Advanced<br>Soil Science—Beginning<br>Soybeans<br>Sunflowers<br>Swine Science<br>Tobacco<br>Vegetable Crop Science<br>Wisconsin Junior Dairywomen's Association (WJDA) |
| Agriculture Processing/Food and Fiber     | Canning Industry and Food Processing<br>Dairy Product Manufacturing<br>Meat Processing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Employment Clusters                                                     | Instructional Units                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agriculture Marketing/<br>Distribution and Retail Services              | Agribusiness Accounting<br>Agricultural Business Management<br>Agricultural Economics<br>Computers in Agriculture<br>Cooperatives<br>Dairy Marketing<br>Estate Planning<br>Farm Business Income and Expense Records<br>Financial Planning and Estate Transfer of<br>Family-Held Business<br>Livestock Marketing<br>Marketing                                                    |
| Agriculture Supplies and Services                                       | Agricultural Sales and Service                                                                                                                                                                                                                                                                                                                                                  |
| Agriculture Mechanization/Engineering and<br>Technical Support Services | Agricultural Carpentry<br>Agricultural Machinery<br>Agricultural Metalworking<br>Agricultural Structures<br>Concrete Masonry Technology<br>Electricity, Agricultural Power<br>Energy Alternatives<br>Hydraulics<br>Metal Fabrication<br>Safety in Agriculture<br>Small Gasoline Engines<br>Tractors and Engines                                                                 |
| Agriculture Resources Management                                        | Big Game Management in Wisconsin<br>Conservation and Soils<br>Energy Conservation<br>Environmental Conservation<br>Fish and Fish Management<br>Forest Science<br>Groundwater Quality and Management<br>Landscaping<br>Natural Resources<br>Pesticide Technology<br>Pollution<br>Recreation Management<br>Turf Management<br>Waste Management<br>Weed Identification and Control |

## Employment Clusters and Related Instructional Units

| Employment Clusters                    | Instructional Units                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional Employment in Agriculture | Agricultural Communications<br>FFA Organization                                                                                                                                                                                                                                                                                                                                         |
| Cross-Cluster                          | Career Opportunities in Agriculture<br>Cooperative Education Programs<br>Exploratory Course<br>Human Relations<br>Local, State, National, and International<br>Agricultural Production Levels and Trends<br>Parliamentary Procedure<br>Supervised Agricultural Experience (SAE)<br>Programs—Agribusiness<br>Supervised Agricultural Experience (SAE)<br>Programs—Production Agriculture |

Table 1

## Content Organization for Agriculture Science/Production Management

| Major Topics                        | Instructional Concerns                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic Sciences                      | Biology<br>Chemistry<br>Geology<br>Ecology<br>Energy<br>Career Opportunities in Agriscience                                                                                                                                                                                                                                             |
| Animal Sciences                     | Taxonomy<br>Domesticated Animals<br>Fish and Wildlife<br>Career Opportunities in Agriscience                                                                                                                                                                                                                                            |
| Plant and Soil Science              | Soils Types and Classification<br>Soil Fertility and Management<br>Plant Taxonomy<br>Principles of Plant Growth<br>Classification and Identification of Agricultural Crops<br>Career Opportunities in Agriscience                                                                                                                       |
| Science and Technology              | Measuring and Problem Solving<br>Land Surveying, Measurement, and Description<br>Agricultural Structures<br>Agricultural Machinery and Equipment<br>Sources of Agricultural Power<br>Career Opportunities in Science and Technology                                                                                                     |
| Livestock Production Management     | Selecting a Livestock Enterprise<br>Dairy Cattle Selection and Management<br>Swine Selection and Management<br>Beef Cattle Selection and Management<br>Other Livestock Enterprises<br>Career Opportunities in the Livestock Industry                                                                                                    |
| Soil and Crop Production Management | Soil Classification; Fertility Management, Tillage Methods, Conservation Practices<br>Classifying and Identifying Agricultural Crops<br>Harvesting and Storage Methods<br>Career Opportunities in Soils and Agronomy                                                                                                                    |
| Horticultural Production Management | Characteristics and Functions of Plant Structures<br>Classifying and Identifying Horticultural Plants<br>Ornamental Horticulture, Greenhouse Management, Lawn and Garden Centers, Nurseries<br>Home and Commercial Fruit and Vegetable Production<br>Specialty Crops in Wisconsin<br>Career Opportunities in the Horticultural Industry |

■ Table 2

## Content Organization for Agriculture Processing/Food and Fiber

| Major Topics                      | Instructional Concerns                                                                                                                                                                                |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction to the Food Industry | Food, Nutrition, and Health<br>Maintaining Food Quality<br>The Food Industry: Organization and Management                                                                                             |
| Processing the Basic Food Groups  | Fruits and Vegetables<br>Grains and Seeds<br>Milk and Dairy Products<br>Meat, Poultry, and Fish                                                                                                       |
| Related Processing Activities     | Beverages<br>Food Additives, Food Ingredients<br>Food Packing Technology<br>Processing Nonfood Products: Wool, Hides, Fur                                                                             |
| Career Opportunities              | Research, Product Development<br>Procurement, Purchasing<br>Shipping, Transportation<br>Processing, Packaging, Storage<br>Grading, Inspection, Quality Protection<br>Personal and Business Management |

Table 3

## Content Organization for Agriculture Marketing/Distribution and Retail Services

| Major Topics                                                        | Instructional Concerns                                                                                                                                                                                                 |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Structure and Function of the<br>Agricultural Marketing<br>Industry | Farm Input Enterprises<br>Developing Markets: Market Research<br>Food and Fiber Manufacturing, Processing<br>Wholesaling/Retailing Food and Fiber                                                                      |
| Determining the Price of Food<br>and Fiber                          | Supply Patterns<br>Consumer Consumption and Demand Patterns<br>The Food and Fiber Bill: Cost, Prices, the Producer's Share                                                                                             |
| Administration and<br>Supervision of Agricultural<br>Marketing      | Marketing Regulations<br>Standardization and Grading<br>Transportation and Storage<br>The Futures Market<br>Market News and Information<br>Government Commodity Programs                                               |
| Career Opportunities                                                | Research, Market Development<br>Procurement, Purchasing<br>Processing, Manufacturing<br>Packaging, Storage<br>Transportation, Shipping<br>Advertising, Merchandising, Sales<br>Financial Services, Business Management |



■ Table 4

## Content Organization for Agriculture Supplies and Services

| Major Topics                                       | Instructional Concerns                                                                                                                                                                                                          |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Types of Business Organizations                    | Individual Ownership<br>Partnership<br>Cooperative, Supply and Purchasing Corporation, Corporate Mergers                                                                                                                        |
| Business Records                                   | Business Records—manual and computerized<br>Business Records Systems, Retail<br>Developing and Analyzing Financial Statements                                                                                                   |
| Finance                                            | Uses and Scope<br>Sources, Financial Institutions<br>Using Credit in Selling<br>Managing Accounts Receivable                                                                                                                    |
| Legal Considerations                               | Regulations and Statutes Affecting the Activity of Salespeople<br>The Uniform Commercial Code, Antitrust Laws and Selling<br>Ethical Issues and Responsibilities                                                                |
| Sales to Agencies, Institutions, and Organizations | Governmental Agencies—federal, state, and municipal institutions (i.e., schools, health care facilities, correctional institutions)<br>Organizations (i.e., trade and professional groups, fraternities, service organizations) |
| Career Opportunities                               | Sales Positions (i.e., manufacturer's representative, wholesaler's representative, retail sales, industrial product sales)<br>Support Staff Positions (i.e., sales training, merchandising, advertising, credit, personnel)     |

## Content Organization for Agriculture Mechanization/ Engineering and Technical Support Services

| Major Topics                     | Instructional Concerns                                                                                                                                                                                                                                 |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction to Mechanics        | Organization and Structure<br>Identification and Safe Use of Basic Hand and Power Tools and Equipment<br>Principles of Carpentry<br>Hot and Cold Metalworking<br>Plumbing and Masonry                                                                  |
| Structures and Materials Systems | Types and Characteristics of Structures<br>Planning and Determining Costs<br>Selection and Preparation of the Building Site<br>Environmental Considerations<br>Selection and Incorporation of Materials Handling Systems<br>Career Opportunities       |
| Machinery and Equipment          | The Economics of Ownership, Alternatives to Ownership<br>Identification and Function of Machinery and Equipment According to Enterprise Activity<br>Organization and Administration of Retail Machinery and Equipment Business<br>Career Opportunities |
| Power                            | Electrical Power: Principles Motors, Applications<br>Internal Combustion Engines: Principles, Power Transfer, Maintenance and Repair<br>Alternative Power Sources (i.e., solar, wind)<br>Career Opportunities                                          |

■ Table 6

## Content Organization for Agriculture Resources Management

| Major Topics                    | Instructional Concerns                                                                                                                                  |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecology and the Environment     | How the Environment Functions<br>Material Resources<br>People and the Environment                                                                       |
| Wildlife Resources              | Identification and Classification<br>Economic and Social Importance<br>Threat<br>Depletion and Extinction<br>Population Patterns<br>Wildlife and People |
| Recreational Resources          | Identification of Resources; Economic and Social Importance<br>Natural Resources; State and Local Resources<br>Resource Management                      |
| Water Resources                 | Supply and Use<br>Managing Water Resources<br>Problems; Threats; the Future                                                                             |
| Energy Resources                | Traditional, Nuclear, and Alternatives Energy Sources<br>Historical Review and Energy Use Trends<br>Energy Conservation                                 |
| Land Resources                  | The Basis of Life and All Things Agricultural<br>Land Forms, Land Classification<br>The Development and Characteristics of Soil<br>Food and the Land    |
| Grassland Resources             | Identification and Distribution<br>Economic and Ecological Importance<br>Grassland/Rangeland Management                                                 |
| Forest Resources                | Classification and Distribution<br>Economic and Ecological Importance<br>Timber Harvest and Uses<br>Forest Resource Management                          |
| Air as a Resource               | The Atmosphere<br>Air Pollution: Nature, Scope, Effect, and Control                                                                                     |
| Other Environmental Concerns    | Noise<br>Odors<br>Space<br>Environmental Action Groups                                                                                                  |
| Agriculture and the Environment | Relationships<br>Challenges<br>Opportunities                                                                                                            |

Table 7

## Content Organization for Professional Employment in Agriculture

| Major Topics                                             | Instructional Concerns                                                                                                                                                                                                                            |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Organization of the Agricultural Food and Fiber Industry | The Scope of Agriculture: County, State, National, and International<br>Food and Fiber Production<br>Processing, Marketing, and Distribution of Agricultural Products<br>Producer and Consumer Services<br>Governmental Agencies and Institutions |
| Employment Clusters                                      | Overview of the Seven Employment Clusters in Agriculture<br>Cooperative Extension Programs<br>Supervised Agricultural Experience Programs                                                                                                         |
| Preparation for Employment                               | Test for Aptitude, Ability, and Personality<br>Preparing Resumes and Applications<br>Making Appointments<br>Interviewing Techniques<br>Lodging, Transportation<br>Supervision                                                                     |
| Job Orientation                                          | Safety Training<br>Departments within a Business or Industry<br>Departmental Functions<br>Employer-Employee Expectations                                                                                                                          |
| Personal Considerations                                  | Buying Insurance<br>Managing Personal Finances<br>Life After High School                                                                                                                                                                          |

## Agribusiness Accounting (20-30 days)

This unit deals with the accounting procedures for agribusinesses. Topics include finances, earnings and analysis of the business, and career opportunities. Also included are the federal and state tax considerations and tax schedules to be filed.

### Objectives

- To acquaint students with employment information and career opportunities in the agribusiness accounting industry
- To develop student understanding of the need for accurate, timely records
- To develop student understanding of fundamental accounting concepts and principles
- To provide students with instruction in the use of accounting terminology
- To instruct students in how to prepare basic accounting records
- To increase student understanding of how accounting records are used to make management decisions in agribusiness operations
- To help students evaluate farm and agribusiness operations using relevant goals and standards
- To emphasize to students the need for complete and accurate records for preparing and validating state and federal tax forms
- To acquaint students with computerized recordkeeping systems for farm and agribusiness operations

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in agribusiness accounting—and relate it to their personal needs and aspirations;
- define and associate words and terms involving agribusiness accounts;
- prepare net worth, net income, and labor income statements;
- compare methods of computing depreciation;
- prepare an inventory for the farm or agribusiness;
- analyze strong and weak points of an agribusiness;
- complete federal and state income tax returns; and
- prepare a Social Security summary for hired labor.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Comparative methods of doing business [Social Studies]
  - Individual proprietorship
  - Partnership
  - Profit and nonprofit corporations (including pseudo)
  - Cooperatives
- Benefits derived from keeping records [Social Studies]
  - Income tax
  - Know where you stand
    - Net worth statement
    - Profit and loss
    - Business analysis of strengths and weaknesses
  - Tool for obtaining credit
  - Division of profits
- Basic terms used in keeping records [Mathematics]<sup>1</sup>
  - Income versus expense
  - Assets versus liabilities
  - Net income versus labor income
  - Net income versus net worth
  - Partial budgets
  - Depreciation methods compared
    - Straight line
    - Double declining balance
    - Sum-of-the-year's-digits
    - Accelerated Cost Recovery System (ACRS)
- Business account records [Mathematics]
  - Business expense
  - Business income
  - Business inventories and depreciation
  - Net earnings statement
  - Net worth statement
- Analysis of business accounts
  - Profitability
    - Returns to labor and management
    - Rate of return to capital invested
    - Operating income/operating expense ratio
  - Solvency
    - Current liabilities/current assets ratio
    - Total liabilities/total assets ratio
- Types of taxes
  - Real estate or property
  - Sales
  - Income
  - Unemployment

- Federal income tax forms and schedules
  - Form 1040, U.S. Individual Income Tax Return
  - Form 3468, Computation of Investment Credit
  - Form 4255, Recapture of Investment Credit
  - Schedule C, Profit or Loss from Business
  - Schedule D, Capital Gains and Losses
  - Schedule F, Farm Income and Expenses
  - Schedule SE, Social Security Self-Employment Tax

### *Motivational Activities*

- Invite a lawyer, accountant, farmer, businessperson, or Internal Revenue Service representative to give a talk on a topic in their field of expertise.
- View films, slides, and videotapes on agribusiness.
- Visit an income tax office.
- Take field trips to local business operations to observe their accounting procedures.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Prepare tax returns on the agribusiness operation used as a class exercise.
- Determine business income and expenses from available records.
- Establish production goals for the agribusiness operation used as a class exercise.
- Set up a depreciation schedule for machinery and equipment on the agribusiness operation used as a class exercise.
- Prepare a net income and net worth statement from available business records.
- Set up an agribusiness accounting system.

### *Instructional Materials*

#### **Textbooks and References**

- Agricultural Economics and Agribusiness* by Gail L. Cramer and Clarence W. Jenson. New York: John Wiley and Sons, 1985. Available from National Farm Book Company.
- Farm Accounting and Business Analysis* by Sydney C. James, and Everett Stoneberg. Ames, IA: Iowa State University Press, 1986. Available from National Farm Book Company.
- The Farm Management Handbook* by W.P. Mortenson and R.A. Luening. Danville, IL: Interstate, 1979.
- An Introduction to Agri-Business Management* by Walter J. Willis. Danville, IL: Interstate, 1979. Available from National Farm Book Company.
- Principles of Management in Agri-Business* by Ken Duft. Reston, VA: Reston Publishing, 1979. Available from National Farm Book Company.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Farm Business Arrangements: Which One for You?* NCR50.
- The Farm Corporation: What It Is—How It Works—How It Is Taxed.* NCR11.



*Income Tax Management for Farmers.* NCR2.

*Managing the Financial Future of Your Dairy Farm.* NCR225.

*Managing the Financial Future of Your Dairy Farm—Analyzing Your Numbers.* NCR225-3.

*Managing the Financial Future of Your Dairy Farm—Determining Your Goals and Values.*  
NCR225-1.

*Managing the Financial Future of Your Dairy Farm—Gathering the Numbers You Need.* NCR225-2.

*Managing the Financial Future of Your Dairy Farm—Using Your Numbers in Decision Making.*  
NCR225-4.

*Managing Your Farm Financial Future.* NCR34.

*Planning Your General Farm Partnership Arrangement.* NCR224.

The following is available from the Internal Revenue Service.

*Your Federal Income Tax*

The following is available from Doane Agricultural Service, Inc.

*Tax Management Guide*

The following are available from the United States Department of Agriculture.

*Cooperatives in Agribusiness.* S/N001-000-04349-8.

*Financial Well-Being of Farm Operators and Their Households.* S/N001-019-0048-5.

#### Periodicals

*Doane's Agricultural Report*

*Drovers Journal*

*Farm Journal*

#### Computer Software

The following are available from Hobar Publications.

*F.A.R.M. Aids.* Apple, IBM.

*F.A.R.M. Problems.* Apple.

*Farm Accounting and Record Management.* Apple, IBM.

*The Farming Game.* Apple, IBM.

*Types and Calculating Depreciation.* Apple.

The following are available from Photocom.

*Agricultural Financial Calculations.* Apple, IBM.

*Depreciation.* IBM.

*Farm Records.* Apple, IBM.

## **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Agricultural Business Management.* CLF400.

*Agriculture Management.* CSU280.

*Blank Cash Flow Sheet: Grains.* FE2699.

*Blank Cost Sheet: Cow/Calf.* FE647.

*Equipment Depreciation.* CSU918.

*Income Tax: Corporate/Individual.* FE4300.

## **Laboratory Resources**

The following are available from Ohio Agricultural Education Curriculum Materials Service.

*Coordinated Financial Statements for Agriculture.* 804X. 2nd edition. 1984.

*Set of Financial Statements.* 805X. 1980.

*You and Your Balance Sheet.* 806X. 1985.

The following is available from the Internal Revenue Service.

*Understanding Taxes—Student Workbook.* Publication 21, Publication 22.

## **Films, Videotapes, and Slides**

The following is available from the Bureau of Audio Visual Instruction.

*Farm Records: The Net Worth Statement.* 11342 (VHS videotape, color, 35 minutes). University of Wisconsin, Department of Agricultural Journalism, 1984.

The following is available from Doane Agricultural Service, Inc.

*Increasing Earnings Through Farm Records.* 353A (Filmstrip).

The following is available from the Grange Farm Film Foundation.

*In the Pursuit of Excellence—Agricultural Excellence.* (16mm film, color, 13 minutes)

## **Equipment and Facilities**

Computer/printer/modem

## **Agricultural Business Management (30-90 days)**

This unit deals with agricultural business management in Wisconsin. Topics include career opportunities, farm establishment, organizing and managing the farm business, and the problem-solving, decision-making process.

### *Objectives*

- To acquaint students with employment information and career opportunities in the farm management industry
- To review guidelines used to assess the feasibility of starting a farm business operation
- To increase student awareness of the problems and scope of the management function, administration, and decision-making aspects of the farm business
- To improve student ability to keep accurate financial records and to use them to solve farm management problems
- To develop student understanding of the process used to develop short- and long-range farm business plans
- To give students opportunities to explore ways to make more effective use of the capital resources of a farm business

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural business management industry—and relate it to their personal needs and aspirations;
- identify several criteria for successful entry into the farm business;
- define economic terms such as resource, product, land, labor, capital, and management;
- apply the principles of marginal physical product, marginal value product, and law of diminishing returns;
- interpret the opportunity costs of given products;
- understand the input-input and output-output relationships;
- comprehend the interrelationships of the manager's role in farm businesses;
- identify the cost concepts, including fixed, variable, total, and marginal costs;
- define the revenue and supply concepts in given situations;
- recognize the concepts of risk and uncertainty;
- relate to adjustments of uncertainty in given situations;
- draw conclusions of alternative methods to predict prices and yields;
- develop a long-range plan of farm businesses involving budgets, transition and annual planning, and cash flow statements;
- develop an accurate and complete inventory of all crops, livestock, and equipment required for the management function; and
- explain how financial records and analysis can be used to solve farm management problems.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- **Careers**
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- **Getting established in farming [Social Studies]**
  - Opportunities
    - Renting
    - Ownership
  - Qualifications
  - Training needs and locations
- **Types of farming [Social Studies]**
  - Dairy
  - Crop
  - Livestock
  - Special
- **Opportunity costs of agriculture [Mathematics, Social Studies]**
  - Types
  - Applications
- **Acquiring the farm [Careers, Mathematics, Social Studies]**
  - Personal resources
  - Farm and area resources
  - Personal preference
  - Financial situation
- **Steps in acquiring a farm [Social Studies]**
  - Leasing
  - Parent-child agreements
  - Part-time farming
  - Partnership
  - Purchasing
- **Farm business arrangements [Social Studies]**
  - Sole proprietorship
  - Partnership
  - Limited partnership
  - Corporations
- **Basic economic principles [Mathematics, Social Studies]**
  - Product functions
  - Law of diminishing returns

- **Financing the farm [Social Studies]**
  - Outright purchase
  - Land contracts
  - Installment sales
  - Special arrangements
- **Credit types [Social Studies]**
  - Short term
  - Intermediate term
  - Long term
- **Credit sources [Careers, Social Studies]**
  - Banks
  - Credit unions
  - Farm credit services
    - Production Credit Association (PCA)
    - Farm Credit Bank
  - Farmers Home Administration (FmHA)
  - Insurance
  - Other, (e.g., personal, family, individual, land contracts)
- **Farm records [Mathematics]**
  - Inventory
  - Net worth statement
  - Income records
    - Operating
    - Capital
    - Purchased for resale
    - Nonfarm income
    - Other
  - Expense records
    - Operating
    - Capital
    - Labor
    - Personal (family living)
    - Nonfarm expenses
    - Other
  - Depreciation schedules
  - Filing systems for a farm
  - Record retention
- **Financial records [Mathematics]**
  - Net worth statements
  - Profit and loss statements
  - Cash flow statements
  - Farm business analysis
- **Farm financial ratios [Mathematics]**
  - Current debt to worth

- Equity value
- Net capital
- Solvency
- Liquidity
- Profit to net worth
- Planning procedures [Careers, Social Studies]
  - Family goals
  - Resources available
  - Budget development
  - Labor required
  - Farm business alternatives
  - Compare new plan with present plan
  - Farmstead planning
  - Crop field arrangements
- Preparing budgets [Mathematics]
  - Fixed costs
  - Variable costs
  - Family living costs
- Farm insurance [Social Studies]
  - Negligence
  - Liability
  - Life
  - Health
  - Fire, wind, etc.
- Risk and uncertainty [Social Studies]
  - Types
  - Aspects and conditions
  - Decision criteria under varying states of knowledge
- Other management considerations [Careers, Science, Social Studies]
  - Soil conservation and water management
  - Educational opportunities
    - Cooperative Extension
    - Universities
    - Vocational, technical and adult education colleges
    - Others
  - Types of farm business organizations
  - Government, agricultural stabilization, and conservation services

### *Motivational Activities*

- Take field trips to different kinds of farms.
- Invite resource speakers to discuss different sources of credit and agricultural business arrangements.
- Develop a farm income-and-expense book.

- Analyze financial records, such as financial statements, cash flow, and profit-loss records.
- View films, videotapes, and slides on topics related to this unit.
- Demonstrate computer software for agricultural business management.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Gather the information and prepare the forms necessary to purchase a farm.
- Evaluate the crop enterprises grown on the family or a local farm.
- Complete and interpret the farm business analysis and profit-loss statements for an example farm.
- Develop crop and field plans in relation to livestock needs.
- Evaluate a net worth statement of the family or example farm.
- Develop short- and long-range planning estimates for the family or example farm.

### *Instructional Materials*

#### **Textbooks and References**

- Agri-Business Finance* by Gary T. Devine. Danville, IL: Interstate, 1981. Available from National Farm Book Company.
- Doane's Facts and Figures for Farmers*. 4th ed. Bloomington, MN: Doane Information Services, 1981. Available from Nasco.
- Doane's Farm Management Guide*. 15th ed. Bloomington, MN: Doane Information Services, 1982. Available from Nasco.
- Estate Planning for Farmers* by J.W. Looney. 3rd ed. St. Louis, MO: Doane Information Services, 1979. Available from National Farm Book Company.
- Farm and Ranch Business Management*. Moline, IL: John Deere Company, 1987.
- Farm Estate and Business Planning* by Neil E. Harl. 9th ed. Niles, IL: Century Communications, 1984. Available from National Farm Book Company.
- Farm Management* by Michael D. Boehlize and Vernon R. Eidman. New York: John Wiley and Sons, 1984.
- The Farm Management Handbook* by W.P. Mortenson and R.A. Luening. 6th ed. Danville, IL: Interstate, 1979. Available from National Farm Book Company.
- Financial Management in Agriculture* by John A. Hopkin et al. 3rd ed. Danville, IL: Interstate, 1983. Available from National Farm Book Company.
- Financial Planning in Agriculture* by K.C. Schneeberger and D.D. Osburn. Danville, IL: Interstate, 1977. Available from National Farm Book Company.
- Introduction to Agribusiness* by N. Ormi Rawlins. Englewood Cliffs, NJ: Prentice Hall, 1980. Available from National Farm Book Company.
- Managing the Farm Business* by Larry J. Connor et al. Englewood Cliffs, NJ: Prentice Hall, 1981. Available from National Farm Book Company.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Do Landlords Make a Difference?* A9N3T143.
- Farm Records Example*. A7801211.
- Getting Started in Farming*. NCR81.



*Is Corporate Management of Farming a Threat?* A9N4T143.  
*Planning and Managing Your Farm Business Center.* NCR233.  
*Planning Your General Farm Partnership Arrangement.* NCR224.

### **Periodicals**

*Crops and Soils*  
*Doane's Agricultural Report*  
*Drovers Journal*  
*Wisconsin Agriculturalist*

### **Computer Software**

The following are available from Doane Information Services.

*Ag Check—Financial Recordkeeper.* Apple, IBM.  
*Ag Check Plus—Financial Management System.* Apple, IBM.  
*Ag Disk—Budgeting.* Apple, IBM.  
*Ag Disk—Cash Flow.* Apple, IBM.  
*Ag Disk—Farm Accounting.* Apple, IBM.  
*Ag Disk—Financial Management.* Apple, IBM.  
*Ag Disk—Profit Projector.* Apple, IBM.

The following is available from Farm Business Software Systems, Inc.

*Transaction Plus.* IBM.

The following are available from Hobar Publications.

*Agricultural Marketing and Commodity Futures.* Apple.  
*Farm Accounting Package.* Apple, IBM, TRS.  
*Farm Business Analysis.* Apple.  
*Farm Management and Related Review Package.* Apple, IBM, TRS, Macintosh.  
*Farm and Ranch Business Management and Related Review Package.* Apple, IBM, TRS, Macintosh.  
*The Farming Game.* Apple, IBM.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Farm Management.* Apple, IBM.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Farm Management.* Apple, IBM.

### **Laboratory Resources**

The following are available from the Ohio Agriculture Education Curriculum Materials Service.

*Coordinated Financial Statements for Agriculture.* 804X. 2nd ed. 1984.

*Good Farm Accounts.* 8022M (Student manual). 1979.  
*Set of Financial Statements.* 805X. 1980.  
*You and Your Balance Sheet.* 806X. 1985.

### **Films, Videotapes, and Slides**

The following is available from the Bureau of Audio Visual Instruction.

*Farm Records: The Net Worth Statement.* 11342 (VHS videotape, color, 35 minutes). University of Wisconsin, Department of Agricultural Journalism, 1984.

The following is available from the Grange Farm Film Foundation.

*In the Pursuit of Excellence—Agricultural Excellence.* (16mm film, color, 13 minutes.)

The following is available from the Media Resources Center.

*Estate Planning: Keeping the Farm in the Family.* S28288F (16mm film, color, nine minutes). John Deere Company, 1975.

The following are available from the Modern Talking Picture Service.

*Enterprise Farming.* (16mm film, color, 20 minutes.)

*Estate Planning: A Family Affair.* (16mm film, color, seven minutes.)

The following are available from Vocational Education Productions.

*Agricultural Management Series* consists of the following five color filmstrips, each with cassettes and scripts:

"Agricultural Cooperatives." 1-810-132H.

"Agricultural Credit." 1-810-135H.

"Agricultural Marketing." 1-810-133H.

"Farm and Ranch Management." 1-810-134H.

"Farm Personnel Management." 1-810-136H.

### **Equipment and Facilities**

Computer/printer

## **Agricultural Carpentry (25-35 days)**

This unit deals with the study of agriculture-related carpentry. The topics include employment information, training requirements, safety, hand tools, power tools, building materials, construction principles, building codes, and project planning.

### *Objectives*

- To acquaint students with employment information and career opportunities in the agricultural carpentry industry
- To develop an appreciation for the need for safety when working with hand and power tools
- To increase student ability to use carpentry tools safely and appropriately
- Illustrate how to set up and maintain an efficient and orderly shop
- To provide practice in identifying common building materials and hardware; increase student understanding of their uses and limitations
- To develop student awareness of the principles and practices involved in large building projects
- To develop student understanding of standard terminology for building parts
- To help students recognize and appreciate good craftsmanship and construction

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural carpentry industry—and to relate it to their personal needs and aspirations;
- list safety guidelines and rules governing the shop, the use of hand and power tools and working with electricity;
- define the role the Occupation Safety and Health Administration (OSHA) plays in maintaining a safe workplace;
- identify, condition, and use common hand and power carpentry tools;
- calculate bills of materials;
- prepare a shop plan including a tool and materials inventory, layout, storage, and guidelines for proper shop usage;
- identify common building materials and their uses;
- identify and describe basic construction practices and principles;
- list and identify the standard types of building designs and the advantages and limitations of each; and
- draw to scale and construct a carpentry project.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job description

- Training requirements
- Working conditions
- Opportunity for advancement
- Other factors
- Safety in the agricultural carpentry field [Social Studies]
  - The general safety rules for the agricultural mechanics laboratory
  - Safety instructions for the use of hand and power tools
  - Safety regulations when working with electricity
  - Safety guidelines and regulations established by OSHA
- Tool identification and conditioning [Science]
  - Identification of hand tools
  - Identification of power tools and equipment
  - Conditioning and repair of tools and equipment
  - Demonstration of tool usage
- Bill of materials [Mathematics]
  - Definition bill of materials
  - Proper form
  - Calculation of board feet
  - Calculation of square and running board feet
  - Estimation of labor requirements
  - Computation of costs
- Agriculture mechanics laboratory arrangement [Science]
  - Storage facilities for hand and power equipment
  - Proper agricultural mechanics laboratory usage and layout
  - Lumber, metal, and materials storage
  - Inventory for equipment materials
  - OSHA standards
- Identification of building materials and their uses [Science]
  - Characteristics of woods, metals, concrete, and other construction materials
  - Lumber characteristics and grades
  - Plywood and other fabricated wood products
  - Wood and metal fasteners
    - Nails
    - Screws, hinges, and miscellaneous hardware
    - Adhesives
    - Timber connectors
    - Concrete fasteners
    - Bolts
  - Matched lumber and millwork
- Construction practices [Mathematics]
  - Building nomenclature
  - Foundations
  - Framing

- Sills
- Joists
- Plates
- Subflooring
- Studding
- Framing openings
- Sheathing, siding, flashing
- Roof framing
- Roofing
  - Materials
  - Applications
- Finish
  - Exterior
  - Interior
  - Floors
  - Trim
- Construction principles [Social Studies]
  - Materials required
  - State, county, and local codes
  - Stress and strength
  - Bracing and supports
- Building designs [Social Studies]
  - Names and types of building designs
  - Names and type of roof designs
  - Pole buildings
- Planning the project [Mathematics]
  - Basic drawing and design
  - Scale drawing
  - Measurement and layout
- Trends in the agricultural carpentry industry [Social Studies]

### *Motivational Activities*

- Take field trips to a local lumber company and a variety of building sites.
- Invite a local building contractor to give a class presentation.
- Select and arrange for the class to construct a large building project, such as a garage, greenhouse, or storage shed.
- Post bulletin board displays on topics related to this unit.
- View films, videotapes, and slides on principles of building construction, of former students' projects, and other topics related to agricultural carpentry.

## Learning Activities

- Participate in a Supervised Agricultural Experience program.
- Spend one or more days working for or observing a lumber yard, building contractor, sawmill, building inspector, real estate salesperson, carpenter, mason, or similar occupation.
- Conduct a safety check of all agricultural mechanics laboratory tools and equipment.
- Take an inventory of all agriculture mechanics laboratory tools and equipment.
- Design an agricultural mechanics laboratory layout plan.
- Compile a tool and equipment list for a complete agricultural mechanics laboratory, including the cost of each item.
- Collect and mount various types of fasteners.
- Construct a simple agricultural mechanics laboratory project.
- Determine the cost of materials for a variety of projects.
- Construct scale-model buildings using a cutaway design to show various construction components.
- Design and construct a project of their choice.
- Cut and construct rafters, stairs, and lay roofing on a scale model.

## Instructional Materials

### Textbooks and References

- Carpentry and Building Construction* by John L. Feirer and Gilbert R. Hutchings. 3rd ed. New York: Macmillan, 1986.
- Construction: Principles, Materials and Methods* by John L. Schmidt et al. 5th ed. Danville, IL: Interstate, 1983. Available from National Farm Book Company.
- Estimating for the Building Trades* by Joseph Steinberg and Martin Stempel. 2nd ed. Chicago: American Technical Society, 1973.
- Framing, Sheathing and Insulation* by Raymond P. Jones. Albany, NY: Delmar, 1973. Available from National Farm Book Company.
- Fundamentals of Carpentry 1—Tools, Materials, Practices*. Chicago: American Technical Society, 1969.
- Fundamentals of Carpentry 2—Practical Construction* by Walter E. Durbahn and Elmer W. Sundberg. 4th ed. Chicago: American Technical Society, 1969.
- Modern Carpentry Workbook* by Willis H. Wagner. South Holland, IL: Goodheart-Willcox, 1986. Available from National Farm Book Company.
- Modern Woodworking Workbook* by Willis H. Wagner. South Holland, IL: Goodheart-Willcox, 1986. Available from National Farm Book Company.
- Rafter Layout with the Framing Square for School and Home Workshop* by William F. Bear and Thomas A. Hoerner. rev. St. Paul, MN: Hobar, 1982.
- Roof Framing* by Herman H. Siegele. New York: Sterling, 1976.
- Sawhorse Layout with the Framing Square for School and Home Workshop* by William F. Bear and Thomas A. Hoerner. rev. St. Paul, MN: Hobar, 1971.
- Units in Woodworking* by J.H. Douglass et al. 2nd ed. Albany, NY: Delmar, 1981.
- The Use of Hand Woodworking Tools* by Leo P. McDonnell and A.I. Kaumeheiwa. Albany, NY: Delmar, 1978.
- Use of Portable Power Tools* by Leo P. McDonnell. Albany, NY: Delmar, 1980. Available from National Farm Book Company.
- Woodworking* by Willis H. Wagner. South Holland, IL: Goodheart-Willcox, 1984. Available from National Farm Book Company.

## Bulletins and Pamphlets

The following is available from the American Plywood Association.

*Vo-Ag Plywood Course.* Building plans and brochure series on plywood and its application to farm construction. Free to teachers. 1970. Course titles are as follows:

- "Beef and Dairy Housing."
- "Graining and Feed Storage."
- "Guide to Plywood for Siding."
- "Materials Handling and Fertilizer Bins."
- "Plywood Properties and Grades."
- "Plywood Sheathing for Floors, Walls, and Roofs."
- "Poultry Housing."
- "Rigid Frame Structures."
- "Swine Housing."
- "Unwinding a Tree . . . the Story of Plywood."

The following are available from the Cooperative Extension Service.

- The Calf Hutch—Building and Using.* A2823.
- Flooring for Swine.* PIH53.
- Housing Dairy Replacements.* A3307.
- How to Buy Construction Lumber.* A3035.
- Identifying and Controlling Wood-Destroying Insects.* A3093.
- Preservative Treatment of Wood for Farm Use.* A2982.
- Remodeling Ideas for Farrowing Facilities.* PIH78.

The following are available from Midwest Plan Service.

- Farmstead Planning Handbook.* 1986.
- Structures and Environment Handbook.* 11th ed., rev. 1987.

The following are available from the Alberta Farm Buildings Course, University of Alberta.

- Building Types and Functions.* Lesson two. 1981.
- Insulation and Finishing.* Lesson six. 1981.
- Site Selection, Building Location.* Lesson one. 1981.
- Wood Construction.* Lesson four. 1981.

## Periodicals

- Fine Homebuilding*
- Fine Woodworking*



## Computer Software

The following are available from Hobar Publications.

*Bill of Material Record.* Apple.

*Building Construction and Related Review.* Apple, IBM, TRS, Macintosh.

*Carpentry and Related Review.* Apple, IBM, TRS, Macintosh.

*Construction Job Cost Estimating.* Apple, IBM, TRS.

*Home and Farmstead Safety.* Apple, IBM, TRS, Macintosh.

*Rafter Terminology and Tables.* Apple.

*Tool Safety: Shop and Laboratory Related Review.* Apple, IBM, TRS, Macintosh.

*Types and Costs Calculations of Wood Building Materials.* Apple.

The following are available from the Vocational Agricultural Safety Series, Teaching Aids, Inc.

*Hand Tools.* ACS-248A. Apple II.

*Power Tools.* ACS-249A. Apple II.

*Woodworking.* ACS-256A. Apple II.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Lumber Purlins.* CSU683.

*Lumber Selection.* CSU674.

*Pole Building Construction.* CSU671.

*Poles Posts.* CSU680.

*Roofing Materials.* CSU684.

*Roofing Selection.* CSU675.

*Siding Materials.* CSU685.

## Laboratory Resources

The following are available from Hobar Publications.

*Carpentry Construction Worksheets.* #561. (Set of ten, each in a pad of 25) Also available in individual pads of 25, titles and order numbers are as follows:

"Concrete Float." #552.

"Gluing and Nailing Plywood Gussets—Truss Rafter." #560.

"Layout and Cutting Plywood Gussets—Truss Rafter." #559.

"Lumber Measurement." #551.

"Nail and Tool Carrier." #554.

"Nail Box." #553.

"Rafter Layout with a Tail." #557.

"Rafter Layout without a Tail." #556.

"Sawhorse." #555.

"Truss Rafter Layout." #558.

*Planning Project Construction.* #174. 1974.

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## Films, Videotapes, and Slides

The following are available from Hobar Publications.

*Tools for the Beginning Carpenter.* H-VT1139 (VHS videotape, color, 60 minutes).

*Woodworking Power Tools.* H-ME6100 (Five-tape VHS videotape series, color, 14 to 16 minutes each tape). Individual videotapes from the series also are available, titles and order numbers as are follows:

"Band Saw: Operation & Safety." H-ME-6103.

"Jointer/Surfacer and Accessories: Operation & Safety." H-ME-6104.

"Radial Arm Saw: Operation & Safety." H-ME-6102.

"Table Saw & Accessories: Operation & Safety." H-ME-6101.

"Wood Lathe & Accessories: Operation & Safety." H-ME-6105.

The following are available from Vocational Agriculture Services.

*The Circular Saw - How to Use It Safely.* F462 (57-frame slidefilm).

*The Drill Press - How to Use It Safely.* F461 (48-frame slidefilm).

*The Jointer - How to Use It Safely.* F465 (35-frame slidefilm).

*The Portable Electric Saw—How to Use It Safely.* F465 (57-frame slidefilm).

*The Power Grinder - How to Use It Safely.* F463 (61-frame slidefilm).

*The Radial Arm Saw - How to Use It Safely.* F464 (61-frame slidefilm).

*Truss Construction - A Shop Project.* F425 (63-frame slidefilm).

## Equipment and Facilities

Agricultural carpentry laboratory

Fasteners

Hand and power tools

Lumber

## **Agricultural Communications (10-20 days)**

This unit is designed to teach students general agricultural communication skills. Topics include employment skills and opportunities, verbal and nonverbal skills, and practical application of these skills.

### *Unit Objectives*

- To acquaint students with employment information and career opportunities in the agricultural communications industry
- To increase student understanding of verbal and nonverbal communication processes
- To develop student appreciation of the importance of effective communication in occupational, social, and civic settings
- To increase student understanding of the barriers to effective communication and of strategies for overcoming them
- To increase student self-confidence in a variety of social and interpersonal situations
- To develop student understanding of the principles of effective listening
- To assist students to develop improved skills in public speaking
- To provide students with opportunities to develop and improve written communication skills
- To emphasize to students the importance of various media and communication channels to agriculture
- To enhance student awareness of the basic laws and regulations pertaining to the use of agricultural advertising and media

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural communications industry—and relate it to their personal needs and aspirations;
- demonstrate an understanding of verbal and nonverbal communication processes;
- appreciate the importance of effective communication in occupational, social, and civic settings;
- demonstrate an understanding of the barriers to effective communication and identify strategies for overcoming them;
- demonstrate greater self-confidence in a variety of social and interpersonal situations;
- use the principles of effective listening;
- develop improved skills in public speaking;
- identify and participate in activities for developing and improving written communication skills;
- demonstrate an understanding of the importance of various media and communication channels to agriculture;
- demonstrate an understanding of how to use media in making farm and agribusiness operational decisions; and
- demonstrate an understanding of the basic laws and regulations pertaining to the use of agricultural advertising and media.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- **Careers**
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- **Basic elements of personal communication [Careers]**
  - Sender
  - Message
  - Channel
  - Receiver
- **Personal communications [Careers]**
  - Letter writing
  - Organizing a short talk to a group
  - Organizing and presenting a speech
  - Introducing a speaker
  - Participating in conversations and discussions
  - Using correct telephone procedure
  - Writing a news article
  - Participating in a radio or TV program
  - Reading a person's body language (kinesics)
  - Listening/sensitivity
    - Being genuinely interested in others
    - Smiling
    - Remembering that to another person his or her name is a sweet sound
    - Being a good listener and encouraging others to talk about themselves
    - Talking in terms of the other person's interests
    - Making others feel important
  - Greetings
  - Presenting awards
- **Barriers to successful personal communications [Careers]**
  - The sender telling the receiver what he or she expects to hear
  - Different perceptions between the sender and receiver
  - The receiver incorrectly evaluating the source
  - Words have different meanings
  - Ignore nonverbal cues
  - Receiver emotionally upset
  - Noise
- **Techniques for improved personal communication [Careers]**
  - Feedback
  - Many channels
  - Face-to-face communications
  - Sensitivity to receiver

- Awareness to symbolic meanings
- Careful timing; reinforcing words with action
- Simple language
- Repetition
- Skills for helpful listening [Careers]
  - Be an effective receiver
    - Maintain eye contact
    - Have a relaxed but attentive posture
    - Respond to the sender's statements
  - Interpret feelings
    - Understand that a statement such as "I hate school" may really mean that the person feels scared, rejected, hurt, or frustrated
  - Project acceptance of feelings
    - Use reflecting statements ( e.g., "In other words....," "What your saying is....")
  - Explore alternatives
    - List options
    - Assist talker in describing and measuring impact of each
- Nonverbal distractors of speakers [Careers]
  - Nervous habits
    - Swaying or moving without purpose
    - Riding the podium
    - Playing with coins or keys in pockets
- Nonverbal personal communication [Careers]
  - Facial expression cues
  - Posture cues
  - Hand and arm gestures
  - Body movement cues
  - Eye contact
  - Lack of verbal communication-pause-silence
  - Overall appearance as it affects different audiences
- Tips on conversing in a formal setting [Careers]
  - Be interested and interesting
  - Small-talk topics, such as family, occupation, recreation, and the weather
  - Don't make small talk too small
  - Be a good listener and good conversationalist
  - Think before speaking
- Optional areas of communication awareness [Careers]
  - Use public-speaking techniques
  - Take part in public-speaking events in the FFA
  - Seek opportunities to present extemporaneous and impromptu speeches
  - Build confidence by being involved in small-group settings, clubs, or committees.
  - Become involved in parliamentary procedure and other conduct of meeting guidelines (refer to the "Parliamentary Procedure" unit)
  - Be aware of human relations information and job interviewing techniques (refer to the "Human Relations" unit)

- Introduction to the agricultural communications industry [Careers]
  - History
  - Scope (current)
    - Newspapers
    - Radio and TV stations
  - Effect on modern agriculture
    - Farming and ranching
    - Agribusiness firms
  - Effect on the general public
    - Consumers
    - Government
  - Media
    - Print
    - Broadcast
    - Others ("word of mouth," signs, exhibits, and demonstrations)
  - Benefits
    - Current market information
    - Farm news (help make management decisions)
    - Weather status and predictions
    - Selling and buying information (farm products and farm equipment)
    - "An informed public is a willing public"
  
- Farm advertising as a communication tool [Careers]
  - Historical background
  - Relation to agricultural marketing
  - The Five "M's" of agricultural advertising
    - Market
    - Motives
    - Media
    - Message
    - Measurement
  - Psychology of sales
    - Sales theories
    - Steps of a sales campaign
    - Handling different types of customers
  - Advertising devices
    - Business name
    - Business sign
    - Business stationery
    - Displays and signs
    - Exhibits and demonstrations
    - Classified ads
  - Advertising campaigns
    - Audience selection
    - Media selection
    - Timing
    - Costs
    - Use of outside advertising agency

### Evaluation

#### — Laws and regulations

Truth

Bad taste

Lottery

Right of privacy

Libel

Copyright

Trademarks

### ● Trends in the agricultural communications industry [Careers]

#### — Personnel

#### — Training requirements

#### — Technological advances

#### — Effects on production farming and agribusiness

### *Motivational Activities*

- Take field trips to local weekly newspapers, daily newspapers, radio and television stations, and advertising agencies.
- Observe or participate in a radio or TV farm broadcast.
- Invite resource people from the print and broadcast media to give class presentations.
- View audiovisual presentations on agricultural communications.
- Post bulletin board displays featuring topics on agricultural communications.
- Provide literature from the Wisconsin Press Association and the National Association of Farm Broadcasters.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- List topics you can use to begin a conversation and cues indicating that the conversation should continue.
- List skills you can use for effective listening.
- Demonstrate ways of properly introducing one person to another.
- Express and interpret nonverbal messages in techniques.
- Role-play correct and incorrect telephone techniques.
- Explain the responsibilities of a discussion leader and ways to contribute to a group discussion.
- Develop an introduction about a hypothetical speaker using information from a fact sheet. Read the introduction aloud to the class so they can critique it.
- List all local agricultural communications media, including the names of key contact people and if they accept student news releases on local agricultural events.
- Interview a member or members of the print and broadcast media about job opportunities, qualifications for position, course preparation, working conditions, and advantages and disadvantages of the job.
- Write a classified ad to sell an agricultural product (e.g., used agricultural equipment, hay, herd sire, vegetables, fire wood, land).
- Write a business letter promoting an agricultural product or topic using proper format, then write a detailed advertising campaign to promote it, including exhibits or demonstrations.
- Design and construct a business sign or letterhead.



- Write news releases in class about community agricultural events; submit them to local newspapers and radio and TV stations.
- Research information on professional agricultural communications organizations, such as the following:

- Agricultural Communicators in Education (ACE), formerly American Association of Agricultural College Editors (AAAEA)
- American Agricultural Editors' Association (AAEA)
- National Association of Farm Broadcasters (NAFB)
- Newspaper Farm Editors of America (NFEA)
- Personal Radio Operations—International Federation (PRO-IF), formerly American Radio Council (ARC)

## *Instructional Materials*

### **Textbooks and References**

- Agricultural Business Sales and Marketing*. Columbia, MO: Missouri Instructional Materials Laboratory, 1984. Available from Ohio Agricultural Education Curriculum Materials Service.
- Agricultural News Writing* by Claron B. Burnett, Richard Powers, and John Ross. Dubuque, IA: Kendall/Hunt, 1973.
- Communications Handbook*. Agricultural Communicators in Education. 5th ed. Danville, IL: Interstate, 1988.
- Gale Directory of Publications*. 119th ed. Detroit, MI: Gale Research, 1987.
- Handbook of Agricultural Occupations* by Norman K. Hoover. 4th ed. Danville, IL: Interstate, 1985.
- Communication Strategies: A Guide for Agricultural Change Agents* by Herbert F. Lionberger and Paul H. Gwin. Danville, IL: Interstate, 1982.
- The Five M's of Agricultural Advertising* by Douglas Sorenson. Madison, WI: University of Wisconsin Press, 1967.
- Leadership for Agricultural Industry* by Robert Stewart. New York: Gregg/McGraw-Hill, 1978.
- Technology and Communication Behavior* by Frederick Williams. Belmont, CA: Wadsworth, 1987.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Communicate with Your Elected Officials*. B3222.
- Computers on the Farm*. AF2277.
- Getting the Word Out—A Handbook for Planning a Public Information Campaign*. J3081.

The following are available from the National FFA Supply Service.

- FFA Leadership and Personal Development Series*. (Series of ten) LPD 1 through LPD 10.
- Student Handbook*. NSTH.

### **Periodicals**

- Agri-View*
- The Country Today*

*Farm Industry News*  
*Farm Journal*  
*Successful Farming*  
*Wisconsin Agriculturist*

### **Computer Software**

The following is available from COMPRESS.

*Super Scoup*. Apple.

### **Films, Videotapes, and Slides**

The following are available from the Bureau of Audio Visual Instruction.

*Food and Jobs: Wisconsin Agriculture*. 11370 (VHS videotape, color, 25 minutes) or 11627 (16mm film, color, 25 minutes). University of Wisconsin, Department of Agricultural Journalism, 1987.

*Newspaper Serves Its Community*. 2nd ed. 10583 (16mm film, color, 16 minutes). BFA Educational Media, 1984.

*Television: The Enchanted Mirror*. 10436 (16mm film, color, 29 minutes). Mass Media Ministries, 1981.

The following are available from Nasco.

*Concepts of Effective Leadership*. Z10920N (VHS videotape, 30 minutes).

*Education and Communication Specialists*. Z10929N (VHS videotape, 30 minutes).

*Keys to Effective Speaking*. Z10919N (VHS videotape, 30 minutes).

The following is available from Vocational Agriculture Services.

*Salesmanship in Agriculture Business*. 391 (Slides).

### **Equipment and Facilities**

Computer/printer

## **Agricultural Economics (30-60 days)**

This unit deals with agricultural economics. Topics include career opportunities and employment information, economic background, economic principles, budgeting skills, and recordkeeping and analysis.

### *Objectives*

- To acquaint students with employment information and career opportunities in the farm management and agricultural economics area
- To develop student understanding of basic concepts and principles of agricultural economics
- To assist students in applying economic principles to a variety of problems in farm management
- To provide students with opportunities to prepare various types of budgets and statements for farm operations
- To provide students with a basis for evaluating farm indebtedness and borrowing in specific situations
- To improve student understanding of economic terminology
- To have students apply the principles of marginal physical product, marginal value product, and the law of diminishing returns
- To provide students with information of cost concepts and opportunity cost interpretation
- To emphasize to students the importance of budgeting to farm resources and profit potential
- To instruct students on how to file farm financial records
- To give students opportunities to explore methods of reducing price and product risks
- To increase student ability to estimate credit capacities and interpret loan repayments

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural economics industry—and relate it to their personal needs and aspirations;
- understand appropriate use and meaning of economic terms;
- examine the principles of marginal physical product, marginal value product and the law of diminishing returns;
- prepare "Enterprise Budget," "Partial Budget," and "Whole Farm Budget" forms;
- calculate the percent return for an individual enterprise and for an entire farm business;
- assemble a farm balance sheet and cash flow statement; and
- construct a loan repayment schedule.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements

- Working conditions
- Opportunities for advancement
- Other factors
- Basic economic background
  - Economic term definitions
  - Classification and definition of farm
- Economic principles [Mathematics, Social Studies]
  - Product functions
  - Law of diminishing returns
  - Supply and demand
- Opportunity costs of agriculture [Mathematics]
  - Various opportunity costs defined
  - Applying the theory of opportunity costs
- Cost concepts [Mathematics]
  - Various types
  - Applications
  - Profit versus cost
- Budgeting principles [Mathematics]
  - Purpose of budgeting
  - Enterprise budgeting steps
  - Steps to budgeting for a change (partial)
  - Steps to budgeting for an entire farm business (complete)
- Farm business records [Mathematics]
  - Importance
  - Types
  - Analysis
- Risk and uncertainty
  - Classification
  - Farm product risk reducers
  - Price risk reducers
- Financing [Mathematics, Social Studies]
  - Sources of financial funds for the farm business
  - Economic reasons for borrowing funds
  - Economic reasons for not borrowing funds
  - Borrowing costs
  - Credit and borrowing capacity/limit
  - Cash flow debt repayment
  - Determination of economic life of leveraged assets

### *Motivational Activities*

- Discuss regional agricultural economics using data from a local farm or which is representative of farms in the area.
- Take field trips to farms to collect management information.
- Develop problems for students to solve using a computer.
- Compile farm management information from current literature.
- Develop farm management games for the class to play.
- Invite resource speakers to give presentations to the class.
- Take field trips to local agribusinesses.
- View films, videotapes, and slides about topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Evaluate the crop enterprises grown on the family or a local farm.
- Inventory livestock, crop, and equipment on the family or a local farm.
- Analyze farm business records of a computer-simulated farm.
- Calculate loan payments on a truck loan.
- Compare farm net worth statements from other students' simulated farms.

### *Instructional Materials*

#### Textbooks and References

- Agricultural Economics* by John W. Goodwin. Reston, VA: Reston Publishing, 1982.
- Agricultural Economics and Agribusiness* by Gail L. Cramer and Clarence W. Jensen. 4th ed. New York: John Wiley and Sons, 1985. Available from National Farm Book Company.
- Agriculture, Economics and Resource Management* by Milton M. Snodgrass and Tim Wallace. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1980. Available from National Farm Book Company.
- Doane's Farm Management Guide*. 16th ed. St. Louis, MO: Doane Agricultural Service, 1985.
- Economics: Applications to Agriculture and Agri-business* by E.P. Roy et al. Danville, IL: Interstate, 1981. Available from National Farm Book Company.
- Financial Planning in Agriculture* by Kenneth Schneeberger and Donald D. Osburn. Danville, IL: Interstate, 1977. Available from National Farm Book Company.

#### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Economic, Agronomic and Environmental Implications*. NCR310.
- Economic and Social Changes on Wisconsin Family Farms*. R3105.
- The Economics of Using Reduced Tillage for Corn on Cash Crop Farms*. A3363.
- Futures Markets—Development and Language*. A2913.
- Producer Marketing Management—Cross Hedging Agricultural Commodities*. NCR217-12.
- Producer Marketing Management—Primer on Agricultural Options*. NCR217-1.
- Producer Marketing Management—Seasonality of Cattle Prices*. NCR217-10.
- Producer Marketing Management—Seasonality of Hog Prices*. NCR217-11.

*Producer Marketing Management—The Minimum Price Contract—A New Marketing Alternative.* NCR217-9.

*Producer Marketing Management—Understanding and Using Basis for Grains.* NCR217-8.

*Rental Agreements for Farm Machinery, Equipment and Buildings.* NCR214.

*Theory of Pricing and Storage of Field Crops with an Application to Soybeans.* R3421.

The following are available from Vocational Agriculture Services.

*Income Possibilities for Your Farm.* U2043.

*Fundamentals of Marketing Agricultural Products.* U2046.

*Planning a Profitable Farm Business.* U2001b.

*Record Keeping on the Farm.* U2008c.

*Using Farm Real Estate Loans.* U2033a.

#### Periodicals

*Agricultural Outlook*

*Crops and Soils*

*Doane's Agricultural Report*

*Drovers Journal*

*Farm Journal*

*Successful Farmer*

*Wisconsin Agriculturalist*

#### Laboratory Resources

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Coordinated Financial Statements for Agriculture.* 804X. 2nd ed. Century Communications, 1984.

*Set of Financial Statements.* 805X. 1980.

*You and Your Balance Sheet.* 806X. 1985.

#### Films, Videotapes, and Slides

The following is available from the Bureau of Audio Visual Instruction.

*Farm Records: The Net Worth Statement.* 11342 (VHS videotape, color, 35 minutes). University of Wisconsin, Department of Agricultural Journalism, 1984.

The following is available from Doane Agricultural Service, Inc.

*Increasing Earnings through Farm Records.* 353A (Filmstrip).

The following is available from the Grange Farm Film Foundation.

*In the Pursuit of Excellence—Agricultural Excellence.* (16mm film, color, 13 minutes.)

The following is available from the United States Department of Agriculture.

*Agricultural Outlook Charts*. A-55 (Slide set).

**Equipment and Facilities**

Computers/printer



## **Agricultural Machinery (30-45 days)**

This unit deals with the general areas related with agricultural machinery. Topics include career opportunities, application of simple machines, selection of tillage and harvesting equipment, and the adjustment and maintenance of each.

### *Objectives*

- To acquaint students with employment information and career opportunities in the agricultural machinery industry
- To review the history of the agricultural machinery industry
- To develop student understanding of the application of the simple machines
- To develop student understanding of the various types of drive and bearing systems in agricultural machinery
- To increase student awareness of the limitations of the various metals used in agricultural machinery
- To provide students with opportunities to demonstrate and practice using proper methods for repairing various types of agricultural machinery
- To prepare students to develop and implement preventative maintenance plans for agricultural machines
- To develop student understanding of the principles associated with each unit of operation on tillage, planting, and harvesting equipment
- To acquaint students with procedures for adjusting and calibrating agricultural machines
- To emphasize to students the need to follow safety guidelines when working with agricultural machinery

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural machinery industry—and relate it to their personal needs and aspirations;
- trace the history of the agricultural machinery industry;
- describe power transmission mechanisms in agricultural machinery;
- identify and troubleshoot mechanical malfunctions and perform maintenance operations according to service manuals on the various types of bearings and seals;
- describe the physical properties of the different types of metals used in agricultural machinery and equipment;
- demonstrate repair procedures for various types of metals;
- describe tire construction, sizing, ratings, selection for specific application and winterizing procedures;
- identify the operating principles of the common types of machinery used in agricultural operations and identify the simple machine applied in the equipment;
- describe how particular agricultural machines work;

- demonstrate how to make routine adjustments on selected agricultural machines;
- evaluate the costs of leasing versus renting or purchasing a given piece of machinery;
- list safety guidelines for repairing and operating agricultural machinery; and
- identify major trends in agricultural equipment technology.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- History and origin of agricultural machinery industry
  - Early development
  - Present
  - Future trends in development
- Simple machines [Science]
  - Lever
  - Wheel
  - Incline plane
  - Screw
- How machines transmit power [Science]
  - Belt drives
    - Advantages
    - Disadvantages
    - Troubleshooting problems
  - Chain drives
    - Types of chain drives
    - Advantages
    - Disadvantages
    - Troubleshooting problems
    - Repair techniques and procedures
  - Gear drives
    - Types of gear drives
    - Advantages
    - Disadvantages
    - Troubleshooting problems
  - Other types of drives
    - Reciprocating
    - Crank wheel and lever
    - Crank arm and lever
    - Cam drives
  - Safety release mechanisms
    - Slip clutches

Jump clutches

Shear pins

- Bearings and seals
  - Plain bearings or bushings
    - Solid bearing or sleeve
    - Thrust bearing
    - Split bearing
    - Bearing lubrication
  - Types of antifriction bearings
    - Ball bearings
    - Roller bearings
    - Needle bearings
    - Lubrication of bearings
  - Troubleshooting plain bearings
  - Bearing maintenance
  - Premature failures
  - Seals
    - Dynamic
    - Static
  - Gaskets
  - Sealants
- Metals used in agricultural machinery and equipment [Science]
  - Parts manufactured from carbon steels
    - Low carbon steel
      - 1. hot rolled steel
      - 2. cold rolled steel
    - Medium carbon steel
    - High carbon steel
    - Very high carbon steel
  - Parts manufactured from cast iron
    - Gray cast iron
    - Malleable cast iron
    - White cast iron
    - Ductile cast iron
  - Cast steel parts
  - Drop forging parts
  - High Strength Low Alloy (HSLA) steels
  - Alloy steel parts
    - How heat-treating affects alloy steel parts
      - 1. quenching and tempering
      - 2. normalizing
      - 3. annealing
      - 4. stress relieving
  - Equipment parts manufactured from stainless steels
    - Milking and milk handling equipment
    - Processed foods industry

- Machine and equipment parts manufactured from aluminum
- Repair techniques and procedures
- Special electrodes to repair
- Tires and tracks [Science]
  - Tire construction
  - Industry code for tires
  - Tire inflation
  - Ballast - slippage
  - Duals
  - Tire failures
  - Radials and tractors
  - Types of track shoes
  - Crawler operator tips
  - Correct track tension and adjustment
- Types of machinery
  - Tillage tools
    - Primary
    - Secondary
  - Planting equipment
    - Corn
    - Small grains
    - Forages
    - Specialty crops
  - Harvesting machinery
    - Small grain
    - Corn
    - Forage
    - Specialty crops
  - Material handling equipment
    - Augers, elevators, bunks, bucket elevators
    - Dairy equipment
    - Manure handling
    - Feed processing
      1. portable mills
      2. electric stationary mills
    - Crop drying equipment
      1. bin
      2. batch
      3. continuous
- Units of operation of particular machines
  - Identify unit of operation
  - Identify parts of particular unit
  - Whole unit function versus machine operation
  - Troubleshooting
  - Example: Hay baler (square)
    - History

#### Identification of parts

#### Units of operation

1. picking up
    - function
    - parts
    - repair and adjustment
  2. feeding mechanism
    - parts
    - function
    - repair and adjustment
  3. compressing mechanism
    - parts
    - function
    - repair adjustment
  4. tying mechanism
    - parts
    - function and sequence
    - adjustment and checking
  5. drive chain and chasis
    - parts
    - function of operation
    - repair and adjustment
- Economics of machinery [Mathematics, Social Studies]
    - Leasing
    - Renting
    - Ownership
  - Safety
    - Procedures in shop
    - Procedures in repairing agricultural machinery
    - Procedures in operating agricultural machinery
  - Trends in agricultural machinery manufacturing

#### *Motivational Activities*

- Invite a representative from an agricultural equipment manufacturer to give a class presentation.
- Visit a local agricultural implement dealership.
- Take a tour of an agricultural equipment manufacturer's facilities.
- View films, videotapes, and slides on topics of the unit.
- Post bulletin board displays featuring related unit topics.

#### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Take part in classroom demonstrations.
- Report on the function and operation of a particular piece of agricultural equipment.
- Complete work sheet assignments.

- Assemble a piece of agricultural equipment.
- Repair a piece of agricultural machinery.
- Identify and describe the function of agricultural tools, equipment, and instruments.

## *Instructional Materials*

### **Textbooks and References**

- Farm Machinery and Equipment* by Harris P. Smith and Lambert H. Wilkes. 6th ed. New York: McGraw-Hill, 1976.
- Farm Machinery Fundamentals* by Marshall F. Finner. Madison, WI: American Publishing, 1985.
- Farm Power and Machinery Management* by Donnell Hunt. 8th ed. Ames, IA: Iowa State University Press, 1983. Available from National Farm Book Company.
- Fundamentals of Machine Operation Series*. Series consists of "Agricultural Safety," "Preventative Maintenance," and "Machinery Management." Moline, IL: John Deere Company. Available from National Farm Book Company.
- Machines for Power Farming* by Archie Stone and Harold F. Gulvin. 3rd ed. Ann Arbor, MI: Books on Demand, 1977.
- Modern Concepts of Farm Machinery Management* by Wendell Bowers. Champaign, IL: Stipes Publishing, 1970.
- Modern Farm Power* by W. J. Promersberger et al. 3rd ed. Reston, VA: Reston Publishing, 1979.
- Principles of Farm Machinery* by R. A. Kepner and Roy Bainer. 3rd ed. Westport, CT: AVI Publishing, 1978.

### **Bulletins and Pamphlets**

The following are available from American Association for Vocational Instructional Materials.

- Ball and Roller Bearings*. 901. 1986.
- Pesticides*. 204. 3rd ed. 1988.
- Planning for an Irrigation System*. 501. 1980.

The following is available from Hobar Publications.

- Safe Operation of Agricultural Equipment*. 10076 (Student manual). 1976.

The following are available from Ohio Agricultural Education Curriculum Materials Service.

- Baler Operation, Service and Maintenance*. 7011M. 1977.
- Combines and Combining*. 7006M. 1981.

### **Periodicals**

- Agricultural Engineering*
- Farm Industry News*
- The Furrow*
- Implement and Tractor*
- International Harvester News*

## Computer Software

The following are available from Hobar Publications.

*Ag Machinery Safety and Related Review.* Apple, IBM, TRS, Macintosh.  
*Chains and Belts.* Apple.  
*Introduction to Machinery Management.* Apple.  
*Machinery Cost.* Apple, IBM, TRS.  
*Machinery Selection.* Apple.  
*Preventive Maintenance.* Apple, IBM.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Farm Machinery.* Apple, IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Comparing Combine Efficiency.* HS152.  
*Comparing Planting Equipment.* HS151.  
*Delta Machinery Needs.* HS91.  
*Great Plains Machinery Needs.* HS90.  
*New Tractor Operating Costs.* HS154.

## Laboratory Resources

The following are available from National Farm Book Company.

*Fundamentals of Machinery Operations Student Workbooks*  
*Fundamentals of Service Student Workbooks*

## Films, Videotapes, and Slides

The following are available from Ideal Pictures Film Library.

*Bringing It Home.* (16mm film, color, 18 minutes.) 1976.  
*Double Harness.* (16mm film, color, 15 minutes.) 1976.  
*Roar of Power.* (16mm film, color, 15 minutes.)

The following are available from the Bureau of Audio Visual Instruction.

*Agricultural Tractor Safety.* 01030 (16mm film, color, 22 minutes). Purdue University, 1976.  
*Chance of a Lifetime.* 07577 (16mm film, color, 16 minutes). Ontario Department of Agriculture and Food, 1970.  
*Combine Safety.* 01034 (16mm film, color, 11 minutes). International Photographic Center, 1976.  
*Farm Tractor Safety.* 01044 (16mm film, color, 11 minutes). International Photographic Center, 1976.



*For Whom the Siren Sounds.* 01991 (16mm film, color, 16 minutes). International Photographic Center, 1977.

*Forage Harvest Safety.* 01035 (16mm film, color, 11 minutes). International Photographic Center, 1975.

*Wagon Safety; Also Blowers, Mixers and Spreaders.* 01042 (16mm film, color, 11 minutes). International Photographic Center, 1976.

The following are available from the Gehl Company.

*Haytools Headquarters.* (16mm film, color, 14 minutes.) 1983.

*Mix-All.* (16mm film, color, ten minutes.) 1978.

The following are available from the John Deere Company.

*Fundamentals of Machine Operation Series.* (Slides and transparencies.)

*Fundamentals of Service Series.* (Slides and transparencies.)

The following is available from the Modern Talking Picture Service.

*Old Time Farm Equipment* (16mm film, color, seven minutes.)

## **Agricultural Metalworking (15-45 days)**

This unit deals with metal application in agriculture. Topics include career opportunities, metal laboratory safety, metalworking hand tools, cold metal applications, hot metal applications, sheet metal applications, metalworking power tools, metal fasteners, and forging and foundry.

### *Objectives*

- To acquaint students with employment information and career opportunities in agricultural metal-working
- To increase student awareness of classroom rules and safety procedures in the laboratory
- To acquaint students with metalworking hand tools common to agricultural applications
- To familiarize students with techniques in tool maintenance
- To develop student proficiency in cold metal techniques common to agricultural applications
- To familiarize students with metal heat treatment processes
- To acquaint students with types of metals commonly used in agricultural applications
- To familiarize students with sheet metal layouts and operations
- To acquaint students with operating principles of machining power tools
- To increase student awareness of metal forging and foundry processes

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural applications of the metals industry—and relate it to their personal needs and aspirations;
- follow classroom safety rules by demonstration of safety procedures in the laboratory;
- identify and properly use metalworking hand tools;
- identify and select common metals and types of steel used in tools, metal fabrication, and metal repair common for agricultural applications;
- sharpen common metal tools, such as drill bits, plane irons, auger bits, screwdrivers, and axes, according to specifications;
- demonstrate proper use of taps and dies;
- perform the five heat treating processes used in retaining or restoring desired metal properties;
- demonstrate metal fabrication techniques;
- design, layout, and perform operations on specific metal applications found in agriculture;
- understand power machine tool operation;
- perform simple equipment repairs, and
- understand forging and foundry processes and metals typical to agricultural applications.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers  
— Current and future employment needs

- Job descriptions
- Training requirements
- Working conditions
- Opportunities for advancement
- Other factors
- Safety
  - Classroom and laboratory rules
  - Laboratory procedures
  - Hand and power tools
  - Electrical precautions
  - Occupational and Safety Health Act
- Metal tools [Mathematics]
  - Hand tool identification
  - Hand tool usage
  - Power tool identification
    - Grinder
    - Metal lathe
    - Metal bandsaw
    - Drill press
    - Others
- Cold metal processes [Mathematics]
  - Metal identification
  - Layout tools and use
  - Shaping stock
    - Cutting
    - Drilling
    - Filing
  - Tapping and threading
  - Fastener identification
  - Fastener selection
- Hot metal processes [Mathematics]
  - Heating metal
  - Anvil usage
    - Drawing
    - Cutting
    - Upsetting
    - Bending
    - Punching holes
    - Twisting
  - Heat treating
  - Tempering
- Soldering [Science]
  - Material selection
  - Acid core solder

- Resin core solder
- Soldering processes
- Sheet metal procedures [Mathematics]
  - Pattern layout
  - Forming
    - Cutting
    - Bending
    - Rolling
    - Seaming
  - Edging
    - Wiring
    - Turning
    - Beading and crimping
- Power machine tool operation [Mathematics]
  - Grinder
    - Selection
    - Truing wheel
    - Replacing wheel
    - Operations
  - Metal lathe
    - Specifications
    - Components
    - Setup
    - Operations
  - Metal band saw
    - Specifications
    - Components
    - Setup
    - Operations
  - Drill press
    - Specifications
    - Components and bits
    - Operations
- Forging and foundry processes [Science]
  - Equipment
  - Machine forging
  - Foundry processes
  - Casting metal identification
  - Sand casting procedures

### *Motivational Activities*

- Take a field trip to repair business facility, machine shop, or a farm.
- Identify purchase price of new hand tools and power tools.
- Display reconditioned hand tools and power tools.
- Invite agricultural equipment suppliers to give class presentations.
- View films, videotapes, and slides on unit-related topics.

## Learning Activities

- Participate in a Supervised Agricultural Experience program.
- Apply hand tools and power tools.
- Identify metal fabrication in agricultural machinery and equipment.
- Create bulletin board displays featuring topics related to metalworking.
- Complete a cold metal project, a sheet metal project, and a hot metal project.

## Instructional Materials

### Textbooks and References

- Agricultural Mechanics: Fundamentals and Applications* by Elmer L. Cooper. Albany, NY: Delmar, 1986. Available from Hobar Publications.
- Exploring Metalworking* by John R. Walker. South Holland, IL: Goodheart-Willcox, 1987.
- General Metals* by John L. Feirer. 5th ed. New York: McGraw-Hill, 1980.
- The Making of Tools* by Alexander G. Weygers. New York: Van Nostrand Reinhold, 1973.
- Mechanics in Agriculture* by Lloyd G. Phipps. 3rd ed. Danville, IL: Interstate, 1983.
- Metalwork Technology and Practice* by Oswald A. Ludwig and Willard J. McCarthy. 7th ed. Peoria, IL: Glenco Publishing/Bennett and McKnight, 1982.
- Modern Metal Working* by John R. Walker. South Holland, IL: Goodheart-Willcox, 1986.
- Modern Welding* by Andrew D. Althouse and Carl H. Turnquist. South Holland, IL: Goodheart-Willcox, 1984. Available from Hobar Publications.
- Recycling: Use and Repair of Tools* by Alexander G. Weygers. New York: Van Nostrand Reinhold, 1978.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Care and Sharpening of Lawn and Garden Tools.* A2683.
- How to Build a Front and Side Opening Wagon Rack for Tossed Bales.* A2656.
- Painting Galvanized Steel Surfaces.* A2487.
- Siding and Finishes for Original Construction or Replacement.* A2486.

The following are available from Vocational Agriculture Services.

- Cold Metal Work.* U3002a.
- Ferrous Metals—Properties, Identification and Treatment.* U3041.
- Hot Metal Work.* U3043.
- Metal Roofing and Siding for Farm Structures.* U3045.
- Micrometers and Related Measuring Tools.* U3023.
- Safety in the Shop.* U3022a.
- Sharpening Hand Tools.* U3005.
- Soldering for Home, Farm and Shop.* U3027.

## Periodicals

*Applied Science and Technology Index*

*Industrial Education* (formerly *Industrial Arts and Vocational Education*)

*Popular Science*

## Computer Software

The following are available from Hobar Publications.

*Machine Shop Review*. Apple, IBM, TRS, Macintosh.

*Measurement and Layout Tools*. Apple.

*Reading Inside Micrometers*. Apple.

*Reading Outside Micrometers*. Apple.

*Shop Projects Plan Index*. Apple, IBM, TRS.

*Shop Tools and Equipment Inventory*. Apple, IBM, TRS.

*Tool Safety: Shop and Laboratory Related*. Apple, IBM, TRS, Macintosh.

## Films, Videotapes, and Slides

The following is available from the Bureau of Audio Visual Instruction.

*Lead in Motion*. 00334 (16mm film, color, 21 minutes). Bureau of Mines, 1976.

The following are available from Career Aids, Inc.

*Machine Shop: Engine Lathe*. PX928 (Six color filmstrips with cassettes and instructor's guide).

*Metalworking Industrial Arts Series*. RM8110-S (12 filmstrips with cassettes. May be ordered individually).

*Precision Measuring Tools*. PP328 (Four color filmstrips with cassettes and test materials. May be ordered individually).

*Sheet Metalwork Explained*. BX507 (Seven color filmstrips with cassettes and study guide).

The following are available from Vocational Agriculture Services.

*Drill Press—How to Use It Safely*. F461 (48-frame filmstrip).

*Power Grinder—How to Use It Safely*. F463 (48-frame filmstrip).

## Equipment and facilities

Metal lathes and metalworking tools

Metals obtained from local salvage yards and metal shops

Casting and forging equipment

Tools to sharpen from shops, home, and farm

Equipment repair tools

Drill press

Grinder

Metal band saw

## Agricultural Sales and Services (15-30 days)

This unit deals with agricultural sales and service. Topics include career opportunities, business forms, human relations, job acquisition, sales presentations, sales tickets, product cost, checking, credit, and fringe benefits.

### *Objectives*

- To acquaint students with employment information and career opportunities in the agricultural sales and service industry
- To enhance student understanding of the four forms of business in the American free-enterprise system
- To provide students with an opportunity to review personality traits and abilities required by a prospective employer and conduct a personal interview
- To improve student proficiency in filling out different job applications and writing letters of application
- To increase student understanding of desirable qualities seen in successful people in the sales and service industry
- To enhance student proficiency in customer interaction and sales presentation, including telephone sales techniques
- To develop student understanding of how to close a sale, reasons potential customers resist buying, and means of overcoming these obstacles
- To enable students to correctly complete sales tickets and to practice making correct change
- To create opportunities for students to write out checks and how to scrutinize checks to be cashed
- To provide students with opportunities to identify, complete, and explain various shipping forms
- To develop student proficiency at determining the selling price of items using various markup systems
- To enable students to compute the cost of credit on items, fill out time-payment forms, and determine whether or not a customer is eligible for credit
- To enhance student understanding of various fringe benefits offered by different employers

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunities for advancement, and other factors relative to potential employment in agricultural sales and services—and relate it to their personal needs and aspirations;
- identify and explain the four forms of business in America;
- review personality traits and abilities expected by employers and handle themselves confidently in a personal interview;
- fill out job applications and write letters of application;
- list and discuss the desirable qualities of successful sales and service people;
- conduct proper customer approach and sales presentation techniques, including telephone procedures;



- close a sale and list reasons why a customer will resist buying and ways of overcoming the resistance;
- complete sales tickets and make change with sales tickets;
- write out checks and identify bad checks before cashing them;
- identify, complete, and explain various shipping forms;
- determine selling prices using various markup systems;
- compute the cost of credit, fill out time-payment forms, and determine customer credit eligibility, and
- delineate between various fringe benefits offered by employers.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- American business forms
  - Sole proprietorships
  - Partnerships
  - Corporations
  - Cooperatives
- Human relations [Careers]
  - Employers
    - Personality traits sought
    - Interviewing
      1. mental preparation
      2. grooming
      3. promptness
      4. attentiveness
  - Applications
    - Forms
      1. neatness
      2. accuracy
      3. truth
    - Letters of application
    - Resumes
  - Desirable qualities of sales and service personnel
    - Enterprising, imaginative
    - Assertive
    - Takes initiative
    - Enthusiastic
    - Dependable
    - Courteous
    - Honest

● Sales presentation [Careers, Social Studies]

— Structure

Approach

Presentation

Resistance hurdles

1. enthusiasm
2. asking and answering questions
3. negative attitudes
4. faultfinding
5. price, quality, style

Closing

Mutual benefits to buyer and seller

— Techniques

Media pitches

1. radio advertising
2. television commercials
3. newspaper ads

Telephone sales

1. tone of voice
2. grammar
3. pertinent and informative information
4. positive identification of both parties

Personal sales

1. develop customer interest
2. cultivate customer desire for product
3. relate product to customer need

● Sales tickets [Mathematics]

— Accuracy

Ticket information

Making change

Scanning procedures

— Payment

Checks

Credit cards

Adding machine operation

Cash register operation

— Shipping forms

Inventory forms

Business invoices

Packing slips

Bills of lading

● Product cost [Mathematics]

— Establishing selling price

Merchandising

Stocking

Displaying

— Credit cost

Time-payment forms  
Customer eligibility forms

- Employer fringe benefits [Careers, Mathematics]
  - Options available
  - Insurances
  - Vacation time
  - Mileage
  - Salaries
  - Commissions
  - Union rules
  - Professional organizations
  - Work permit or social security cards
  - Paid holidays
  - Paid expenses

### *Motivational Activities*

- Take field trips to local agribusinesses.
- Invite resource people to give class presentations.
- Post displays featuring topics on agricultural sales and services.
- View films, videotapes, and slides about agricultural sales and services.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Role-play situations depicting how sales and service representatives work with their clients.
- Set up a mock store to gain business experience.
- Take part in a cooperative education program.
- Participate in a job-shadowing program to learn about careers in agricultural sales and service.
- Create a merchandise display.

### *Instructional Materials*

#### **Textbooks and References**

- Agricultural Business Sales and Marketing*. Columbia, MO: Instructional Materials Laboratory, 1984.
- Agricultural Economics and Agribusiness* by Gail L. Cramer and Clarence W. Jensen. 4th ed. New York: John Wiley and Sons, 1988.
- Agricultural Sales and Service Resource Unit—Pilot Program Workshop*. Madison, WI: Department of Public Instruction, 1971.
- Marketing of Agricultural Productions* by Richard L. Kohls and Joseph N. Uhl. 6th ed. New York: Macmillan, 1985.
- Selling in Agribusiness* by Larry Miller. New York: McGraw-Hill, 1979.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Credit Management for Business Firms.* NCR54.  
*Customer Service—Sales and Hospitality.* C2737.  
*Guide to Health Maintenance Organizations in Wisconsin.* B3290.  
*How Consumers Contribute to the Cost of Food Retailing.* B3046.  
*How to Choose Your Checking Account.* B3330.  
*Marketing Crafts: How and Where to Sell.* NCR175.  
*Marketing Crafts: How to Price and Protect Your Work.* NCR176.  
*Marketing Crafts: How to Promote Your Product and Yourself.* NCR178.  
*Shopping for Consumer Credit.* B2863.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Credit.* 9012M.  
*Building an Insurance Program.* 9015M.  
*Getting Hired for Your First Job.* 9007M.  
*Getting Started on Your New Job.* 9009M.  
*Taking Care of Yourself.* 9008M.  
*Using Saving and Checking Accounts.* 9011M.

The following are available from Vocational Agriculture Services.

*Applying for a Job.* U6001b.  
*Customer Credit Management in Agribusiness.* U6008.  
*Fundamentals of Marketing Agricultural Products.* U2046.  
*Human Relations in Agribusiness.* U6003.  
*Salesmanship in Agribusiness.* U6002.  
*Using Insurance in the Farm Business.* U6017.  
*What Factors Affect Prices of Agricultural Products?* U6009.

## Periodicals

*Adweek Midwest*  
*Consumers' Research Magazine*  
*Journal of Retailing*  
*Sales and Marketing Management*  
*Telemarketing Update*

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Adjusting for Risk.* HS96.  
*Determining Credit Limits.* HS21.  
*Employer Rights and Liability.* HS104.  
*Establishing Credit Limits.* HS20.

*How to Choose a Lender.* HS24.

*Meaning of Price.* HS217.

*Sources of Credit.* FE2210.

### Laboratory Resources

The following are available from Interstate Printers and Publishers, Inc.

*Succeeding on the Job: A Self-Study Guide for Students.* 1970.

*Supervising on the Job: A Self-Study Guide for Students.* 1970.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Office Procedures Used in the Agricultural Services.* 9216M. 1977.

### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Customer Service: It Pays to Please.* 11560 (VHS videotape, color, 19 minutes) or 11561 (16mm film, color, 19 minutes). AIMS, 1985.

*Customer Service: Strategies for Success.* 11579 (16mm film, color, 13 minutes) or 11580 (VHS videotape, color, 13 minutes). McGraw-Hill, 1986.

*Telemarketing I: Customer Services: A Backup Sales Force.* 10206 (16mm film, color, 14 minutes). Centron, 1983.

*Telemarketing II: Becoming a Pro on the Phone.* 10207 (16mm film, color, 13 minutes). Centron, 1983.

*Telemarketing III: Techniques for the the Phone Service Representative.* 10208 (16mm film, color, 12 minutes). Centron, 1983.

*Telemarketing IV: Getting the Order.* 11098 (VHS videotape, color, 17 minutes). Coronet, 1984.

*Telemarketing V: Dealing with Customer Objections.* 11096 (VHS videotape, color, 17 minutes). Coronet, 1984.

*Telemarketing VI: Controlling the Collection Call.* 11097 (VHS videotape, color, 17 minutes). Coronet, 1985.

### Equipment and Facilities

Bills of lading

Inventory forms

Packing slips

Daily business forms

Check blanks

Loan forms/time payment forms

Cash register/adding machine

Sales tickets

Scales

Supplies to set up a mock store

## Agricultural Structures (5-10 days)

This unit deals with the improvement, maintenance, construction, and design of agricultural buildings. Topics include career opportunities, agricultural building arrangements, types of construction, systems of handling agricultural products, space requirements, utility needs, and cost analysis.

### Objectives

- To acquaint students with employment information and career opportunities in the agricultural structures industry
- To give students opportunities to examine ways to evaluate agricultural building arrangements
- To develop student understanding of the basic aspects of building construction and design
- To give students opportunities to examine various material handling systems used in agricultural building construction and design

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the field of agricultural structures and materials handling—and relate it to their personal needs and aspirations;
- explain the principles of organizing agricultural building arrangements and be able to apply these principles to an actual farm situation;
- identify the types of construction common to various agricultural housing needs;
- identify and compare types of feed, grain, roughage, waste disposal, and milk handling equipment;
- identify the space requirements for agricultural livestock housing and crop and machinery storage using resource data;
- determine the utility needs for the various types of agricultural construction; and
- estimate costs for building livestock housing and crop and machinery storage, including installation of materials and handling equipment, using current construction prices.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Agricultural building arrangements
  - Placement

- Rearrangements for efficiency
- Building and zoning codes
- Types of building construction
  - Materials
  - Design
  - Trends
  - Drainage regulations
  - Building codes and county ordinances
- Systems of handling farm products
  - Feed, grain, and roughage distribution and drying
  - Waste disposal
  - Milking systems
- Space requirements [Mathematics]
  - Livestock housing
  - Crops storage
  - Machinery storage
- Utility needs
  - Electrical
  - Ventilation
  - Heating
  - Plumbing
  - Codes
- Cost analysis [Mathematics]
  - Construction costs
  - Equipment costs

### *Motivational Activities*

- Take field trips to different types of construction and handling systems.
- Invite resource people to give class presentations on materials handling equipment and types of construction.
- View films, videotapes, and slides on topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Sketch a model farmstead.
- Design and construct scale models of various agricultural building components.
- Calculate a cost analysis of agricultural building waste-handling systems.
- Solve production problems.



## Instructional Materials

### Textbooks and References

- Agricultural Buildings and Structures* by James H. Whitaker. Reston, VA: Reston Publishing, 1979.  
*Agricultural Wiring Handbook*. 7th ed. Columbia, MO: National Food and Energy Council, n.d.  
*American Metric Handbook* by R.J. Lytle. New York: McGraw-Hill, 1981.  
*Buildings for Small Acreages: Farm, Ranch, and Recreation* by James S. Boyd. Danville, IL: Interstate, 1978.  
*Electrical Construction Wiring* by W.N. Alerich. Homewood, IL: American Technical Publishers, 1971.  
*Farm Builder's Handbook* by R.J. Lytle. 3rd ed. New York: McGraw-Hill, 1983.  
*Farm Buildings: From Planning to Completion* by Richard E. Phillips. St. Louis, MO: Doane Information Services, 1981.  
*Plumbing Installation and Design* by L.V. Ripka. 2nd ed. Homewood, IL: American Technical Publishers, 1987.  
*Practical Farm Buildings: A Text and Handbook* by James S. Boyd. 2nd ed. Danville, IL: Interstate, 1979.  
*Residential Wiring* by G. Rockis. Homewood, IL: American Technical Publishers, 1978.

### Bulletins and Pamphlets

The following are available from the American Association for Vocational Instructional Materials.

- Maintaining the Lighting and Wiring System*. 1980.  
*Planning Machinery Protection*. 1976.  
*Shop Planning*. 3rd ed. 1975.  
*Utility Buildings*. 2nd ed. 1974.

The following are available from the Cooperative Extension Service.

- Cattle Handling Corral Design Construction Tips and Layouts*. A2793.  
*Converting Dairy Barns to Modern Farrowing Facilities*. A2819.  
*Decking for Nursery Pigs*. PIH77.  
*Flooring for Swine*. PIH53.  
*Housing Your Flock*. A2830.  
*How to Buy Construction Lumber*. A3035.  
*Plumbing for Home and Farmstead*. AF2213.  
*Siding and Finishes for Original Construction or Replacement*. A2486.  
*Solid Manure Handling for Livestock Housing, Feeding and Yard Facilities in Wisconsin*. A2418.

The following are available from the Midwest Plan Service.

- Beef Handbook—Housing and Equipment*. MWPS-6.  
*Dairy Handbook—Housing and Equipment*. MWPS-7.  
*Designs for Glued Trusses*. MWPS-9.  
*Farmstead Planning Handbook*. MWPS-2.  
*Sheep Handbook—Housing and Equipment*. MWPS-3.

*Structures and Environment Handbook*. MWPS-1.  
*Swine Handbook—Housing and Equipment*. MWPS-8.

The following are available from the Minnesota Extension Service.

*How to Plan Your Stall Dairy Barn*. AG-BU-1315.  
*Remodeling Ideas for Farrowing Facilities*. AG-FO-0849.

The following are available from Vocational Agriculture Services.

*Building with Concrete Masonry*. U3034.  
*Concrete Improvements—Farm and Home*. U3007.  
*Designing, Installing, Maintaining, and Repairing Plumbing Systems*. U3056.  
*Electrical Wiring Procedures*. U3016.  
*Lumber: Grading, Selecting, Buying, etc.* U3055.  
*Metal Roofing and Siding for Farm Structures*. U3045.  
*Plywood Applications in Farm Construction*. U3042.  
*Using the Carpenter's Square*. U3009.

#### Periodicals

*Farm Industry News*

#### Computer Software

The following is available from the American Association for Vocational Instructional Materials.

*Electrical Wiring*. 305CS. Apple.

The following are available from Hobar Publications.

*Bill of Materials Record*. Apple.  
*Building Construction and Related Review*. Apple, IBM, TRS, Macintosh.  
*Building Materials Costs*. Apple, IBM, TRS.  
*Carpentry and Related Review*. Apple, IBM, TRS, Macintosh.  
*Construction Job Cost Estimating*. Apple, IBM, TRS.  
*Rafter Terminology and Tables*. Apple.  
*Types and Cost Calculations of Wood Building Materials*. Apple.

The following are available from Photocom.

*Math for Carpenters*. 31-109-2.  
*Math for Estimating Construction Materials and Costs*. 31-109-3.  
*Safety Series: Farm Building*. 28-254A.

### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Building Layout.* CSU679.

*Building Sites.* CSU672.

*Pole Building Construction.* CSU671.

### Films, Videotapes, and Slides

The following is available from the American Association for Vocational Instructional Materials.

*Understanding Electricity and Electrical Terms.* S303 (Slides), or AV303-2F (Filmstrip)

The following are available from the American Zinc Institute.

*How to Make Galvanized Roofs Last Longer.* (Filmstrip.)

*Metallic Zinc Paint for Metal Surfaces* (34-frame color filmstrips.)

The following are available from Hobar Publications.

*Construction.* H-VCL-15 (VHS videotape, 36 minutes).

*Insulation for Livestock Buildings.* 305 (22 color slides with cassette).

The following are available from Photocom.

*Harvesting, Storage, and Utilization.* 30-695 (VHS videotape, 30 minutes).

*Housing and Equipment.* 30-697 (VHS videotape, 38 minutes).

*Welding for Construction.* 08-025 (Filmstrip with cassette).

## Animal Nutrition (20-30 days)

This unit deals with animal nutrition. Topics include careers, basic nutrients and functions; basic nutrients of feeds; ruminant digestion; monogastric digestion; avian digestion; psuedo-ruminant digestion; basic rules for feeding, ration balancing, feeding systems, and new developments in livestock feeding.

### *Objectives*

- To acquaint students with employment information and career opportunities in the animal nutrition industry
- To develop student understanding of the basic nutrient requirements of livestock
- To help students relate nutrient requirements to biological processes in animal organisms
- To provide students with a basis for evaluating various types of feeds as sources of specific nutrients
- To enhance student comprehension of ruminant digestion and its importance as a source of food
- To provide students with information on how to design balanced and economical ration for animals
- To enhance students' ability to recognize and treat problems that arise in livestock from nutritional deficiencies
- To assist students to obtain and use feed analysis data to make effective management decisions
- To provide students with information needed to analyze and evaluate harvesting and feed storage alternatives

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job description, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in animal nutrition industry and—relate it to their personal needs and aspirations;
- list and discuss the basic nutrients and their function;
- define the terms associated with feed analysis;
- identify on a drawing the parts and functions of the digestive tract;
- describe in sequence the digestive processes;
- define major categories of nutrient use in the animal body and apply the National Research Council (NRC) tables concerning animal nutritive requirements;
- list the specific rules for feeding;
- identify symptoms, diagnosis, prevention, and treatment of nutrient deficiencies;
- interpret and apply NRC data on nutrient content of common feeds;
- formulate a balanced ration when given specific information;
- list the economic advantages in the use of home-grown feed;
- determine least-cost rations using alternative feed supplements;
- interpret and compare ingredients listed on feed tags to determine most economical feed;
- use the correct procedures to obtain feed samples for chemical analysis;
- interpret and apply information from chemical feed analysis;
- list harvesting and storage alternatives and compare the quality of feed; and
- identify new concepts in feeding.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job description
  - Training requirements
  - Working conditions
  - Opportunity for advancement
  - Other factors
- Introduction [Science, Social Studies]
  - Importance of good feeding
  - Economic considerations
- Basic nutrients and functions [Science]
  - Carbohydrates
  - Fats
  - Proteins
  - Minerals
  - Vitamins
  - Water
- Nutritive values of feeds [Science]
  - Roughages
    - Dry matter
    - Crude and digestible protein
    - Total digestible nutrients (TDN)
    - Estimated net energy (ENE)
    - Crude fiber
    - Minerals
    - Vitamins
    - Palatability factor
  - Concentrates
    - Dry matter
    - Crude and digestible protein
    - Total digestible nutrients (TDN)
    - Estimated net energy (ENE)
    - Crude fiber
    - Minerals
    - Vitamins
    - Palatability factor
- Ruminant digestive process [Science]
  - Parts and functions of digestive tract
  - Digestive processes
    - Mechanical factors
    - Chemical factors

- Monogastric digestion [Science]
  - Parts and functions of digestive tract
  - Digestive processes
    - Mechanical factors
    - Chemical factors
- Pseudo-ruminant digestion [Science]
  - Parts of the digestive tract
  - Digestive processes
    - Mechanical factors
    - Enzymes
    - Bacteria
- Nutritive requirements of all classes of animals [Science]
  - Maintenance
  - Growth
  - Reproduction
  - Production
  - Herd health as affected by feeding
- Basic rules for feeding [Mathematics, Science]
  - Roughage
  - Grain
  - Dry matter basis
  - As-fed basis
- Balancing rations [Mathematics, Science]
  - Nutritive requirements of animals
    - Protein
    - Total digestible nutrients
    - Minerals and vitamins
  - Home-grown feeds
    - Maximum utilization
    - Economics
  - Purchased feed
    - Ration supplements
      1. protein
      2. vitamins
      3. minerals
      4. additives
    - Roughages and grains
    - Economics
  - Analysis of commercial feeds
  - Analysis of home-grown feeds
- Feeding systems and feed quality [Science]
  - Harvesting alternatives
  - Storage alternatives
- New developments [Science, Social Studies]

## *Motivational Activities*

- Compare the home-feeding programs of several local farms to accepted standards.
- Take field trips to a local feed mill or an outstanding farm area.
- Invite resource people, such as county extension agents, feed dealers, and veterinarians, to give class presentations.
- View films, videotapes, and slides on unit-related topics.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Create feed sample displays.
- Balance rations according to National Research Council Feeding Guide.
- Examine the digestive tract of a slaughtered animal.
- Collect feed tags for comparison.
- Develop a least-cost ration using a computer.
- Demonstrate on-farm forage and grain sampling.
- Visit several farms and compare their forage harvesting and storage alternatives.
- Invite a veterinarian to speak to class on how feeding affects animal health.

## *Instructional Materials*

### **Textbooks and References**

- Animal Nutrition and Feeding* by James R. Gillespie. Albany, NY: Delmar, 1987.
- Approved Practices in Feeds and Feeding* by Daniel W. Cessard et al. 5th ed. Danville, IL: Interstate, 1977.
- Dairy Farm Management* by Thomas Quinn. Albany, NY: Delmar, 1980.
- Feed Formulations* by Tilden W. Perry. 3rd ed. Danville, IL: Interstate, 1982. Available from National Farm Book Company.
- Feeds and Feeding* by Frank B. Morrison. Abridged. Clinton, IA: Morrison Publishing, 1961.
- Feeds and Nutrition* by M.E. Ensminger and C.G. Olentine, Jr.. Danville, IL: Interstate, 1978. Complete and abridged editions available from National Farm Book Company.
- Livestock and Poultry Production* by Clarence E. Bundy and Ronald V. Diggins. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1982. Available from National Farm Book Company.
- Modern Livestock and Poultry Production* by James R. Gillespie. 2nd ed. Albany, NY: Delmar, 1983.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Forage Tests and Computerized Balanced Rations Really Pay.* A7780109.
- Selecting the Grain Mix Protein Level in Dairy Rations.* A2183.
- Taking a Good Forage Sample.* A2309.

The following is available from the Instructional Materials Laboratory.

### *Animal Nutrition Unit*



The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Feeding Dairy Cattle*. 414X. New York Instructional Materials Service, 1982.

*Livestock Management*. 401X (29-pamphlet series). Texas Instructional Materials Service.

*Livestock Nutrition and Feeding*. 4004M. 1979.

The following is available from Vocational Agriculture Services.

*General Facts on Livestock Feeding*. U1013a.

### Periodicals

*Animal Health and Nutrition* (formerly *Animal Nutrition and Health*)

*Dairy Herd Management*

*Dairymen's Digest—North Central Region Edition*

*Farm Journal*

*Feedstuffs*

*Hoard's Dairyman*

*Journal of Dairy Science*

*Successful Farming*

*Wisconsin Agriculturist*

### Computer Software

The following is available from ACS Software Publishing.

*Livestock Management Games*. ACS215 (Set of four games). Apple. Individual games from the set also may be ordered, titles and order numbers are as follows:

"Cattle Management Game." ACS211.

"Dairy Management Game." ACS214.

"Sheep Management Game." ACS212.

"Swine Management Game." ACS 213.

The following is available from Agri-Farm Productions, Inc.

*Feed Shopper*. A3248. Apple.

The following area available from Mid States Agri-Technology Associates, Ltd.

*Dairy Ration Master*. Apple.

*Micro-Tutor: Feeds and Feeding*. Apple, IBM.

The following is available from Hobar Publications.

*Dairy Ration Balancing*. IBM.

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Dairy Feed Equipment.* HS84.

*Feed Buying.* ADN60.

*Herd Feeding.* CSU375.

*Management Plans: Cattle on Feed I.* HS605.

*Management Plans: Cattle on Feed II.* HS608.

*Storage of Animal Feed.* HS68.

### **Laboratory Resources**

The following is available from the National Vocational Agriculture Book Company.

*Vocational Agriculture Workbook No. #2.*

### **Films, Videotapes, and Slides**

The following are available from Agri-Farm Publications, Inc.

*Nutrition.* 5680 (VHS videotape, color, 28 minutes).

*Planning Sheep Nutrition.* (VHS videotape.)

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Swine Digestion.* 4015S (12 color slides with illustrated script) or 4015N (Script only). 1977.

The following is available from the Media Resources Center.

*Rumen Story.* (16mm film, color, 25 minutes). Ralston Purina Company, n.d.

## Aquaculture\*

This unit deals with the cultivation and propagation of aquatic plants and animals. Topics include career opportunities, history of aquaculture, aquatic plant and animal species, economics of aquaculture, state and federal aquaculture regulations, site requirements for aquaculture, diseases of aquatic plants and animals, nutrition in aquaculture, aquatic management practices, and aquatic structures and equipment.

### *Objectives*

- To acquaint students with employment information and career opportunities in the aquaculture industry
- To acquaint students with the history and terminology associated with aquaculture
- To familiarize students with aquatic plant and animal species
- To acquaint students with economic principles related to the aquaculture industry
- To provide students with information on state and federal regulations concerning aquaculture
- To illustrate to students the physical and chemical characteristics of water and aquacultural sites
- To familiarize students with disease symptoms and control of aquatic plants and animals
- To give students opportunities to examine the nutritional requirements of aquatic plants and animals
- To inform students about the accepted practices in aquacultural management
- To enhance student comprehension of the common aquacultural structures and equipment

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the aquaculture industry—and relate it to their personal needs and aspirations;
- identify the major practices associated with aquaculture history;
- define terms common to the aquaculture industry;
- describe common aquatic plants and animals;
- recognize the supply-and-demand characteristics associated with the aquaculture industry;
- describe the income and expenses typical to an aquacultural enterprise;
- list major rules and regulations pertaining to the aquaculture industry;
- describe the physical and chemical characteristics of water and aquacultural sites;
- demonstrate an understanding of diseases and disease control of aquatic plants and animals;
- analyze the nutritional requirements and nutrient sources of aquatic plants and animals;
- recognize the management practices associated with the aquaculture industry; and
- describe typical aquacultural structures and equipment.

\*This unit has not been field tested.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Aquaculture introduction and history [Social Studies]
  - Definitions
  - Historical patterns and practices
    - Pre-1900
    - 1900 to 1950
    - 1950 to present
  - Fishing practices
    - Commercial
    - Subsistence
    - Sports
- Aquatic plants and animals [Science]
  - Wisconsin aquatic plant species
    - Common names
    - Physical characteristics
      - 1. color
      - 2. size
      - 3. shapes
    - Plant uses and management
  - Wisconsin aquatic animal species
    - Common names
    - Physical characteristics
      - 1. color
      - 2. size
      - 3. anatomy
  - Consumer demand
- Economics of aquaculture [Social Studies]
  - International production
    - Aquatic animals
    - Aquatic plants
  - International consumption
    - Aquatic animals
    - Aquatic plants
  - Marketing
    - Fresh product markets
    - Processed product markets
    - Price of fish and aquatic plants compared to red meat and white meat

— Aquaculture business expenses

Input costs for fish production

1. fry or fingerling
2. feed mixtures
3. water chemicals
4. structures
5. equipment
  - water testing
  - harvesting
  - collection
  - aeration
  - heater
6. supplies
7. transportation
8. processing and storage
9. electricity or fuel power
10. antibiotics and sanitation
11. labor
  - hired
  - family

Fixed costs for fish production

1. capital
2. land
3. taxes
4. opportunity costs
5. business operations
  - insurance
  - recordkeeping
  - income taxes
  - interest payments
  - depreciation
  - licenses

Income from fish

1. sales receipts from fresh fish
2. sales receipts from fish by-products
3. miscellaneous income

Labor income

1. beginning inventory and expenses
2. closing inventory and expenses
3. calculation of labor income

• State and federal legislation [Social Studies]

— Wisconsin statutes and rules

- Private fish hatcheries statute
- Release and importation of fish and wildlife code
- Introducing fish and game code
- State hatchery licensing statutes

- Federal statutes and rules
  - Private fish hatcheries regulations
  - Release and importation regulations
  - Interstate commerce regulations
- Site requirements for aquaculture [Science]
  - Water survey
    - Planning
    - Base line map
    - Traverse line map
    - Bottom and edge contours
    - Map symbols
    - Bottom and edge classification
    - Aquatic plant classification
    - Aquatic animal classification
    - Water supply
    - Water purity
  - Chemical analysis
    - Temperature
    - Density
    - pH
    - Chemical contaminants
    - Chemical pollutants
  - Physical analysis
    - Color and turbidity
    - Transparency
    - Plankton
    - Bottom and edges
    - Aquatic plants
    - Aquatic animals
    - Pollutants and contaminants
    - Plant and fish autopsy
  - Water storage characteristics
    - Water level and volume
    - Water retention and supply
    - Shelter
    - Food supply
    - Erosion
    - Silt
    - Turbidity
    - Pollution
    - Contamination
    - Fertility
    - Population density
    - Competition
    - Diseases
    - Parasites
    - Temperatures
    - Width and depth

Bottom and edge characteristics

Predation

Survival rates

• Diseases of aquatic plants and animals [Science]

— Bacterial infections

Disease types

Symptoms and characteristics

Prevention

Control

— Viral infections

Disease types

Symptoms and characteristics

Prevention

Control

— Parasites infections

Disease types

Symptoms and characteristics

Prevention

Control

• Nutritional requirements in aquaculture [Science]

— Aquatic plants

Macronutrient requirements

Micronutrient requirements

Nutrient deficiency symptoms

pH requirements

Temperature ranges

Tolerance of pollutants and contaminants

— Aquatic animals

Protein requirements

Caloric requirements

Vitamin requirements

Mineral requirements

Fiber requirements

pH requirements

Temperature ranges

Pollutants and contaminants tolerances

• Aquatic management practices [Social Studies]

— Aquatic plants

Species sources

Nutritional requirements

Harvesting methods

Marketing and processing

— Aquatic animals

Sources of species

Habitat

Feed requirements



Pond culture

1. site and construction
2. water supply and temperature
3. pH levels
4. pollutants

Stocking

1. reproduction and growth
2. confinement rearing
3. breeding and selection
4. polyculture

Controls

1. water supply and levels
2. disease
3. parasites
4. predators
5. purging

Yields

1. rate of gain
2. feed conversion

Harvest methods and processing

1. netting and seining
2. handling
3. hand-processing
4. commercial processing
5. storage

Marketing

1. inspection
2. pricing
3. quality indicators
4. fresh fish
5. processed fish

• Aquatic structures and equipment [Mathematics]

— Water storage structures

Natural sites

1. ponds
2. streams
3. watershed

Constructed containers

1. metal and lined containers
2. concrete containers
3. glass containers

— Aquatic equipment

Oxygen

1. natural supply
2. aquatic plants
3. aeration equipment

#### Feeding

1. hand-feeding
2. automatic feeders
3. mechanical feeders

#### Disease control

1. hand-administered antibiotics
2. automated released antibiotics

#### • Harvesting

1. hand-collection
2. netting
3. mechanic collection

#### Processing

1. hand tools
2. automatic processors
  - wall models
  - floor models

#### Transportation

1. fish pump
2. fish power loader
3. water tanks
4. refrigeration
5. processed packages
  - frozen
  - canning
  - fresh packs

### *Motivational Activities*

- Take a field trip to a fish hatchery or fish farm
- Invite resource people to give class presentations.
- Post bulletin board displays featuring topics related to this unit.
- View films, videotapes, and slides on aquaculture-related topics
- Make available to the students computer software related to aquaculture

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect water samples and test them for their physical and chemical characteristics.
- Examine the characteristics of fish tanks and ponds.
- Experiment with fish-feeding practices and report your findings.
- Complete computer exercises on aquaculture
- Demonstrate how to clean and fillet fish.

## Instructional Materials

### Textbooks and References

- Adaptive Management of Renewable Resources* by Carl J. Walters. New York: Macmillan, 1986.
- Aquaculture: The Farming and Husbandry of Freshwater and Marine Organisms* by John E. Bardach, John H. Ryther and W.O. McLarney. New York: John Wiley and Sons, 1972.
- Fish Farming Handbook* by E. Evan Brown and John B. Gratzek. Westport, CT: AVI Publishing, 1980.
- Fish Hatchery Management* by R.G. Piper et al. Bethesda, MD: American Fisheries Society, 1986.
- Fish Nutrition*. Edited by John E. Halver. New York: Academic Press, 1972.
- Recent Advances in Aquaculture*. Edited by James F. Muir and Ronald J. Roberts. Boulder, CO: Westview Press, 1982.
- Textbook of Fish Culture: Breeding and Cultivation of Fish* by Marcel Huet. 2nd ed. Englewood, NJ: Universe Publishing, 1986.
- Textbook of Fish Health* by George Post. Hong Kong: TFH Publications, 1987.
- Trout and Salmon Culture* by Earl Leitzitz and Robert C. Lewis. Fish Bulletin 164. Sacramento, CA: Department of Fish and Game, 1976.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Cost Per Serving Guide for Meat, Poultry and Fish*. B2193.
- Fish—Low in Calories, High in Nutrition*. B78872.
- Home Canning of Fish*. B78866C.
- Home Freezing of Fish*. B78870F.
- Home Pickling of Fish*. B78864P.
- Home Smoking of Fish*. B78865S.
- The Supply and Demand for Yellow Perch*. R3006.
- Wisconsin Farm Fish Ponds*. Manual 2.

The following are available from the Wisconsin Department of Natural Resources.

- Guide to Wisconsin Aquatic Plants*. PUBL-WR-173 88. 1988.
- Lake Sturgeon*. PUBL-FM-704 88. 1988.
- Master Angler Program*. (Instructor's edition.) 1988.
- Master Angler Program*. (Student's edition.) 1988.
- Muskellunge*. PUBL-FM-705 89. 1989.
- Northern Pike*. PUBL-FM-707 89. 1989.
- Wisconsin Fishing*. PUBL-FM 204 88REV. 1988.

### Periodicals

- Aquaculture Digest*  
*Aquaculture Magazine*  
*Water Farming Journal*

## Computer Software

The following is available from Hobar Publications.

*Fish and Wildlife in the Upper Midwest and Related Review.* Apple, IBM, TRS, Macintosh.

## Laboratory Resources

Water testing equipment

Water testing chemicals

## Films, Videotapes, and Slides

The following is available from the Bureau of Audio Visual Instruction.

*Fish—The Food with a Catch to It.* 04562 (16mm film, color, 11 minutes). Centron, 1978.

The following is available from the Encyclopaedia Britannica Educational Corporation.

*Fish Embryo—From Fertilization to Hatching.* (16mm film, color, 12 minutes.) 1963.

The following is available from the Pennsylvania Instructional Materials Service.

*A Trout Stream in Winter.* (16mm film, color, 18 minutes.) 1979.

## Equipment and Facilities

Aquariums (various shapes, sizes, types)

Feeding systems

    Response (self-feeders)

    Continuous feeders

    Pond dike feeders

    Tank feeders

Fillet knives

Nets

Scales

Seines

## Beef Cattle Science (14-45 days)

This unit deals with the management and care of beef cattle and its related industry. Topics include careers, breeding stock management, beef cattle production systems, beef cattle facilities, health and sanitation, fitting and showing of beef cattle, and marketing of beef cattle.

### *Objectives*

- To acquaint students with employment information and career opportunities in the beef science industry
- To provide students with the history of the beef science industry
- To provide students with criteria needed to evaluate beef production as a means of producing income and other personal values
- To create student awareness of approved beef production management techniques including breeding, marketing, feeding, disease and pest management, and waste management
- To make students familiar with the extent and nature of government involvement in the regulation of the beef production industry

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the beef science industry—and to relate it to their personal needs and aspirations;
- understand the systems of beef production;
- describe chronologically the cow, calf, and bull through all phases of their productive life;
- identify beef breeds and the respective characteristics and advantages of each;
- understand the physiological make-up of cattle and relate it to management practices of beef science;
- identify the diseases and pests of beef cattle and their prevention, control, and treatment;
- understand the current Food and Drug Administration regulations of drugs and chemicals pertaining to raising and marketing beef cattle;
- understand the environmental and fertility impact of proper waste disposal; and
- understand the proper marketing of beef cattle through carcass grading, showing and fitting, consumer market preferences, and local marketing channels.

*Subject Matter* (Basic skills integration areas are shown in brackets following title)

- Careers
  - Current and future employment needs
  - Job description
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Historical background of the beef industry
  - Early development to present
  - Characteristics of breeds
- Systems of beef production [Science]
  - Cow-calf operations
    - Calving to weaning
    - Calving to finishing
  - Feeder calf to market (long-term feeding)
  - Yearling to market (short-term feeding)
  - Breeding stock production
- Breeding herd management [Social Studies]
  - Selection
  - Before breeding
  - Gestation
  - Calving
  - Lactation
  - Artificial insemination
  - Embryo transfer
  - Genetic engineering
  - Crossbreeding
- Calf and young stock management
  - Calving time to weaning
  - Weaning to maturity
- Beef facilities
  - Confinement
  - Semiconfinement
  - Designing functional facilities
- Health and sanitation [Science]
  - Disease and parasites related to beef cattle
    - Identification
    - Control
    - Treatment
    - Prevention
  - State and federal rules and regulations
    - Drugs and chemicals
    - Inspection
- Fitting and showing of beef animals
- Marketing [Social Studies]
  - Types of markets
  - Market classes and grades
    - Factors determining classes
    - Sex classes

- Age or group classes
- Weight classes
- Consumer market preferences
- Local marketing channels

### *Motivational Activities*

- Take field trips to observe of breeding stock and market cattle.
- Take field trips to beef cattle operations to view their buildings, equipment, and other facilities.
- Take field trips to agribusinesses associated with the beef industry.
- View audiovisual materials on beef production.
- Post bulletin board displays featuring topics related to this unit.
- Invite resource people to give class presentations.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect and interpret performance data.
- Evaluate live cattle.
- Complete individual student research projects.

### *Instructional Materials*

#### **Textbooks and References**

- Animal Science* by M. Eugene Ensminger. 8th ed. Danville, IL: Interstate, 1983.
- Approved Practices in Beef Cattle Production* by E.M. Juergenson. 5th ed. Danville, IL: Interstate, 1980. Available from National Farm Book Company.
- The Artificial Insemination and Embryo Transfer of Dairy and Beef Cattle: A Handbook and Laboratory Manual* by H.A. Herman and F.W. Madden. 7th ed. Danville, IL: Interstate, 1987.
- Beef Cattle* by A.L. Neumann and Keith S. Lusby. 8th ed. New York: John Wiley and Sons, 1986. Available from National Farm Book Company.
- Beef Cattle Science* by M. Eugene Ensminger. 6th ed. Danville, IL: Interstate, 1987.
- Beef Production* by Clarence E. Bundy and Ronald V. Diggins. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Beef Production and the Beef Industry: A Beef Producers Perspective* by Robert E. Taylor. Edina, MN: Burgess International, 1984. Available from National Farm Book Company.
- Diseases of Feedlot Cattle* by R. Jensen and Donald R. Mackey. 3rd ed. Philadelphia: Lea & Febiger, 1979. Available from National Farm Book Company.
- Livestock and Poultry Production* by Clarence E. Bundy and Ronald V. Diggins. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1982. Available from National Farm Book Company.
- The Meat We Eat* by John Romans et al. 12th ed. Danville, IL: Interstate, 1985.
- Modern Livestock and Poultry Production* by James R. Gillespie. Albany, NY: Delmar, 1985. Available from National Farm Book Company.
- Raising a Calf for Beef* by Phyllis Hobson. Pownal, VT: Storey Communications, 1976. Available from National Farm Book Company.
- The Stockman's Handbook* by M. Eugene Ensminger. 6th ed. Danville, IL: Interstate, 1984. Available from National Farm Book Company.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Alfalfa for Beef Cows.* A8MOAFBC.  
*Beef Cattle Breeds.* AF2228.  
*Beef Cow-Calf Health Guide.* A3042.  
*Beef Production Glossary.* BIF:FS1.  
*Calving Difficulty in Beef Cattle.* BIF:FS6.  
*Cattle Abnormalities.* A78861CA.  
*A Complete Forage Plan for Livestock in Wisconsin.* A2550.  
*Culling the Commercial Cow Herd.* BIF:FS7.  
*The Farm Beef Herd.* AF2126.  
*Freeze Branding.* A2824.  
*Identifying Your Cattle.* A2834.  
*Modern Commercial Beef Sire Selection.* BIF:FS9.  
*Pest Control on Cattle.* A2212.  
*Postmortem Abnormalities of Beef.* A78868BE.  
*Profit Guidelines for Purchasing Feeder Cattle.* A2677.  
*Raising Veal Calves.* A8MAB106.  
*Rations for Beef Cattle.* A2387.  
*The Systems Concept of Beef Production.* BIF:FS8.  
*Understanding and Using Sire Summaries.* BIF:FS3.  
*Understanding Performance Pedigrees.* BIF:FS2.  
*Utilizing Performance Data in Judging Classes.* BIF:FS5.  
*Utilizing Performance Records in Commercial Beef Herds.* BIF:FS4.  
*Wisconsin Farm Enterprise Budgets Holstein Steers.* A3360.

## Periodicals

*Beef*  
*Doane's Agricultural Report*  
*Drovers Journal*  
*Farm Journal: Beef Extra*

## Computer Software

The following are available from Agri-Farm Publications, Inc.

*Beef Cattle Management Tutor.* 3221. Apple.  
*Cattle Weight Adjustments.* A3250. Apple.  
*Livestock Management Game—Cattle Management.* A3201. Apple.  
*VISICALC Feeder Livestock Template.* 3081. Apple.

The following are available from Cherrygrath Farms Software, Inc.

*Beef Herd History.* Apple.  
*Beef Herd Management.* Apple.  
*Beef Production Records.* Apple.

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*Cattle Ration Analysis.* Apple.  
*Finishing Feeder Cattle.* Apple.

The following is available from Fred's Micro-ware.

*Cattle Program.* Apple.

The following are available from Hobar Publications.

*Beef Production and Related Review.* Apple, IBM, TRS, Macintosh.  
*Calf Crop.* Apple, IBM, TRS.  
*Farm Accounting and Records Management Problems.* Apple.  
*Livestock Diseases and Parasites.* Apple.  
*Livestock Diseases, Parasites and Related Review.* Apple, IBM, TRS, Macintosh.  
*Management Decisions: Grow Corn or Soybeans, Raise Steers or Hogs.* Apple.

The following is available from Micro Learningware.

*Cattle Program.* IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: Beef.* Apple.  
*Agri-Quiz: Beef.* Apple, IBM.

#### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Beef Breeds.* CSU372.  
*Beef Cow and Calf Health Program.* HS704.  
*Beef Diseases.* CSU380.  
*Beef Selection.* CSU373.  
*Breeding Beef Production.* CSU371.  
*Computers for Livestock Records.* HS210.  
*Marketing Beef.* CSU381.

#### **Laboratory Resources**

The following is available from Interstate Printers and Publishers, Inc.

*The Artificial Insemination and Embryo Transfer of Dairy and Beef Cattle: A Handbook and Laboratory Manual* by H.A. Herman and F.W. Madden. 7th ed. 1987.

The following are available from the National Vocational Agriculture Book Company.

*Vocational Agriculture Math Problems Workbook.* 2nd ed.  
*Vocational Agriculture Workbook #2.*

## Films, Videotapes, and Slides

The following are available from Nasco.

*Beef Cattle Identification.* C11976N (Color filmstrip with cassette).

*Combating Diseases and Parasites of Cattle—Parts I and II.* C10454N (Two color filmstrips with teacher's guides. Part I, 45 frames; Part II, 71 frames).

*Cow/Calf Production.* C11972N (Color filmstrip with cassette).

*Market and Feeder Cattle Selection.* C11970N (Color filmstrip with cassette).

*Preparing Beef Cattle for the Show.* C10133N (45 color slides).

The following is available from Venard Films.

*7000 Years New.* (16mm film). North American Limousin Foundation, n.d.

The following are available from Vocational Education Productions.

*Beef Management Practices.* 1-415-20H (Seven filmstrips, each with a cassette and booklet).

*Beef Production Systems.* 1-424-230H (Three filmstrips, each with a cassette and script).

*Beef Selection Kit.* 1-416-200H (Three filmstrips, each with a cassette and script).

*The Reproduction Kit.* 1-413-230H (Two filmstrips, each with a cassette and booklet).

The following is available from Vocational Media Associates.

*Beef Production.* 30800-93 (Seven sound filmstrips or slidesets, program guide, and reproducible masters).

## Equipment and Facilities

Veterinary supplies

Syringes

Needles

Implant gun

Dehorner

Castration equipment

Identification equipment

Balling gun

Fitting and showing equipment

## Beekeeping (5-15 days)

This unit deals with various aspects of beekeeping. Topics include career information, economics, bee races and types, safety, seasonal bee management, and marketing aspects.

### *Objectives*

- To acquaint students with employment information and career opportunities in the area of beekeeping
- To provide students with information on how to assess the feasibility of beekeeping as a primary or supplemental source of income
- To help students differentiate between the various races and types of bees
- To develop student understanding of the history of beekeeping
- To increase student understanding of safety guidelines for working with bees
- To develop student understanding of seasonal management operations for beekeeping
- To develop student awareness of marketing techniques and channels used in beekeeping operations

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the beekeeping industry—and relate it to their personal needs and aspirations;
- describe the origin and development of the practice of beekeeping;
- recognize the major classifications of bees kept in the United States;
- recognize the different types of bees in a hive;
- identify and explain the basic parts of a beehive;
- light and use a smoker;
- describe and sequence seasonal management operations used in beekeeping; and
- identify markets and marketing channels for various bee products.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- History of beekeeping
  - Egyptians
  - Indians
  - Wisconsin

- Bee races [Science]
  - Italians
  - Caucasians
- Colony and components [Science]
  - Types of bees
    - Worker
    - Drone
    - Queen
  - Equipment
    - Stand
    - Bottom board
    - Brood chambers
    - Inner cover
    - Telescoping cover
    - Queen extruder
    - Super
  - Protective gear
  - Smokers and extracting gear
- Protection of the hive
  - Guard bees
  - Bee sting
  - Bee dance
    - Wagtail
    - Short steps
- Seasonal management of hive
  - Package installation
  - Spring build-up for honey flow
  - Honey gathering
  - Supering the hive
  - Removal of honey crop
    - Bee escapes
    - Fume boards
    - Bee blowers
  - Fall feeding
  - Winter preparation
  - Spring disease inspection
    - Foul brood
    - Chalk brood
    - Noscoma
    - Mites
- Markets for bee products [Social Studies]
  - Transporting
  - Local
  - State
  - National

## *Motivational Activities*

- Take a field trip to a bee yard.
- Post bulletin board displays featuring topics related to this unit.
- Place a live bee display in the classroom.
- View films, videotapes, and slides on beekeeping.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Prepare a bee management plan.
- Describe the steps involved in honey processing.
- Taste-test several kinds of honey.

## *Instructional Materials*

### **Textbooks and References**

- ABC and XYZ of Bee Culture* by E. R. Root and H. H. Root. 39th ed., rev. Medina, OH: A. I. Root, 1983. Available from National Farm Book Company and Nasco.
- All About Bees, Beekeeping, and Honey* by Walter L. Gojmerac. New York: Drake Publishers, 1977.
- Beekeeping in the Midwest* by E. R. Jaycox. Champaign, IL: University of Illinois Press, 1985.
- Bees, Beekeeping, Honey, and Pollination* by Walter L. Gojmerac. Westport, CT: AVI Publishing, 1980.
- Contemporary Queen Rearing* by Harry H. Laidlaw. Hamilton, IL: Dadant and Sons, 1979. Available from National Farm Book Company.
- First Lessons in Beekeeping*. Edited by C. P. Dadant. Hamilton, IL: Dadant and Sons, 1976. Available from National Farm Book Company.
- 500 Answers to Bee Questions* by George S. Demuth. 3rd ed. Medina, OH: A. I. Root, 1955. Available from National Farm Book Company.
- Hive and the Honey Bee*. Edited by Dadant and Sons. Hamilton, IL: Dadant and Sons, 1975. Available from National Farm Book Company.
- The Illustrated Encyclopedia of Beekeeping* by Roger A. Morse. New York: E. P. Dutton, 1984.
- Keeping Bees* by John Vivian. Charlotte, VT: Williamson Publishing, 1986. Available from Nasco.
- Practical Beekeeping* by Enoch Tompkins and Roger Griffith. Pownal, VT: Storey Communications, 1977. Available from Nasco.
- The Queen Must Die!: And Other Affairs of Bees and Men* by William Longgood. New York: W. W. Norton, 1985.
- A Year in the Beeyard* by Roger A. Morse. New York: Charles Scribner's Sons, 1983.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Beekeeping in the Midwest*. A8IL1125.
- Beekeeping Records*. A2655.
- Building and Operating an Observation Beehive*. A2491.
- Honey Bees and Pesticides—Understanding the Issues*. A3357.
- Honey—Guide to Efficient Production*. A2083.

*Protecting Honey Bees in Wisconsin from Pesticides and Other Toxic Chemicals.* A3086.  
*Using Honey Bees to Pollinate Crops.* AL549.

The following are available from the Minnesota Extension Service.

*Chemical Control of Honey Bee Diseases.* AG-FS-2226. 1984.  
*Nuisance Wasps and Bees.* AG-FS-1017. 1985.  
*Protecting Honey Bees from Insecticides.* AG-FS-1028. 1987.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Approved Practices for Beekeeping.* 607X. Pennsylvania Instructional Materials Service, 1978.  
*Fundamentals of Beekeeping.* n.d. 604X. Pennsylvania Instructional Materials Service, n.d.

### Periodicals

*American Bee Journal*  
*American Beekeeping Federation Newsletter*  
*Speedy Bee*

### Computer Software

The following is available from Doane Agricultural Service, Inc.

*Bee Hive Management and Inventory Control*

### Films, Videotapes, and Slides

The following are available from Agri-Farm Publications, Inc.

*Keeping Honeybees/Getting Started.* 5683 (VHS videotape, 40 minutes).  
*Setting Up an Apiary.* 5684 (VHS videotape, 44 minutes).  
*Summer Hive Management.* 5685 (VHS videotape, 30 minutes).  
*Winter Hive Management/Second Spring Hive Management.* 5686 (VHS videotape, 55 minutes).

The following are available from the Bureau of Audio Visual Instruction.

*The Bee.* 05955 (16mm film, color, 28 minutes). Time Life, 1975.  
*The Beekeeper.* 00501 (16mm film, color, 15 minutes). AIMS, 1975.  
*Bee Management: Fall and Winter* and *Bee Management: Late Winter and Early Spring.* 01761 (16mm film, color, 20 minutes). University of Wisconsin, Department of Agricultural Journalism, 1977.  
*Bee Management: Honey Handling.* 01762 (16mm film, color, 17 minutes). University of Wisconsin, Department of Agricultural Journalism, 1977.  
*Honeybees and Pesticides: Understanding the Issues.* 11349 (VHS videotape, color, 19 minutes). University of Wisconsin, Department of Agricultural Journalism, 1985.  
*Killer Bees—Fact or Fiction.* 04778 (16mm film, color, 14 minutes). National Audio Visual Center, 1978.  
*Life Cycle of a Honeybee.* 01637 (16mm film, color, 12 minutes). National Geographic Society, 1976.

*Life of a Honeybee*. 2nd ed. 10068 (16mm film, color, 22 minutes). Encyclopaedia Britannica Educational Corporation, 1980.

*Putting Wild Bees to Work*. 09306 (16mm film, color, 26 minutes). Utah State University, 1974.

*Wasps: Paper Makers of the Summer*. 06627 (16mm film, color, 10 minutes). Learning Corporation of America, 1973.

The following are available from the University of Wisconsin-La Crosse Film Rental Library.

*The Beekeeper*. 4B517/C (16mm film, color, 13 minutes). ACI Media, 1975.

*Bees: Backyard Science*. 4B718/C (16mm film, color, 13 minutes). BFA Educational Media, 1978.

The following is available from Vocational Education Productions.

*The Business of Bees*. 1-613-230H (Sound filmstrip).

### Equipment and Facilities

Computer/printer



## Big Game Management in Wisconsin (10 days)

This unit deals with the management of big game in Wisconsin. Topics include species identification, population management, carrying capacity, trophy management, measuring and recording, and career opportunities in game management.

### *Objectives*

- To acquaint students with employment information and career opportunities in the game management industry
- To provide students with information on the history and management of big game animals in Wisconsin
- To increase student understanding of the habitats that different big game species require and the effect people have on these habitats
- To help students articulate a personal big game management philosophy
- To enable students to distinguish between renewable and nonrenewable resources and relate these concepts to big game management
- To introduce students to the concept of "carrying capacity" as it relates to big game animals
- To acquaint students with the procedures used to measure and record big game trophy animals
- To develop student understanding of the life cycles of various species of big game animals
- To acquaint students with the role of the Wisconsin Department of Natural Resources (DNR) in big game management
- To develop student appreciation for the importance of the various records used to manage big game animals
- To acquaint students with the parasites of big game animals in Wisconsin

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the big game management industry—and relate it to their personal needs and aspirations;
- identify three important time periods and explain what happened during each period regarding Wisconsin big game management;
- collect and identify six types of deer browse;
- list four renewable natural resources and four nonrenewable natural resources in Wisconsin;
- collect color pictures of the species, sexes, and age classifications of Wisconsin big game animals;
- differentiate between a white-tailed buck's antlers and a mule deer's antlers;
- demonstrate how to locate information in a Wisconsin hunting regulations pamphlet;
- describe the proper big game species habitat;
- identify four pieces of equipment used to measure big game trophies;
- complete a big game scoring form;
- explain the concept of carrying capacity;
- identify species of big game found in North America;
- identify external and internal parasites common to bear and deer;



- describe the reproductive cycle of deer and bear; and
- define the following terms: cub, boar, sow, doe, buck, antler, spike, fawn, rub, scrape, marker tree, den, rut, and yearling.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Species identification [Science]
  - White-tailed deer
  - Black bear
  - Coyote
  - Wolf
- Wisconsin big game management history
  - Indian hunting
  - White men hunting
  - Use of the entire deer carcass
  - Indian treaties
  - Hunting laws
  - Antlerless hunts
  - Bow hunting
  - Gun versus bow rivalry
  - Antihunters philosophy
- Carrying capacity [Science]
  - Proper habitat
  - Preferred diet
  - Nutritional requirements
  - Herd composition and populations
- Population management [Science]
  - Natural control
    - Starvation
    - Diseases
    - Parasites
    - Predators
  - Artificial control
    - Department of Natural Resources management
    - Road kills
    - Gun and bow hunting

- Trophy management, measuring, and recording [**Mathematics**]

- Herd composition
- Philosophies of trophy management
  - Boone and Crockett Club
  - Pope and Young Club
  - Wisconsin Buck and Bear Club
- Measuring forms
- Measuring tools
- Record books
  - Boone and Crockett
  - Pope and Young
  - Wisconsin Buck and Bear

- The future of big game animals in Wisconsin

### *Motivational Activities*

- Take field trips to
  - a zoo to observe white-tailed deer and black bears;
  - local alfalfa fields and dumps at dusk to view big game species;
  - the Sandhill Wildlife Refuge at Babcock, Wisconsin, to learn about the DNR's deer management studies;
  - the Wisconsin Deer Classic, held in Madison in April; and
  - a scoring seminar sponsored by the Wisconsin Buck and Bear Club.
- Invite resource people to give class presentations on big game management issues.
- View films, videotapes, and slides on unit-related topics.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Develop bulletin board displays featuring how big game species, such as white-tailed deer and black bears, look at different stages of their lives and at different times of the year.
- Create displays of deer racks, shed antlers, tanned hides, mounts, skulls of big game species, and gear used to hunt big game.
- Review the three types of big game scoring forms used in Wisconsin.
- Score a rack of horns or a bear skull.
- Demonstrate how to examine deer teeth to determine the animal's age.
- Review the *Wisconsin Deer and Bear Record Book*.
- Participate in Project Wild or Project Learning Tree programs.

### *Instructional Materials*

#### **Textbooks and References**

- Audubon Field Guide to North American Mammals* by Audubon Society and John D. Whitaker, Jr.  
New York: Alfred A. Knopf, 1980. Available from National Farm Book Company.
- Black Bears—A Technical and Hunting Guidebook* by Bob McGuire. Blountville, TN: Bow Hunting Productions, 1983.

*Bowhunting Big Game Records of North America*. Edited by Lee Kline. Placerville, CA: Pope and Young Club, 1987.

*Deer in Their World* by Erwin A. Bauer. New York: Outdoor Life Books, 1983.

*The Deer of North America* by Leonard L. Rue. New York: Crown Publishers, 1982.

*A Field Guide to Animal Tracks* by Murie J. Olaus. 2nd ed. Boston, MA: Houghton Mifflin, 1975.

*Field Guide to Mammals* by William H. Burt. 3rd ed. Boston, MA: Houghton Mifflin, 1976. Available from National Farm Book Company.

*Getting the Most From Your Game and Fish* by Robert Candy. Putney, VT: Alan C. Hood, 1984. Available from National Farm Book Company.

*Investigations in Conservation of Natural Resources* by Richard A. Lytle and Harry B. Kircher. Danville, IL: Interstate, 1979.

*Our National Resources* by Harry B. Kircher and P.E. McNall. Danville, IL: Interstate, 1970.

*Producing Quality Whitetails* by Al Brothers and Murphy E. Ray Jr. 2nd ed. Kingsville, TX: Caesar Kleber Wildlife Research Institute, 1982.

*White-tailed Deer* by Lowell K. Halls. Harrisburg, PA: Stackpole Books, 1984.

*Wildlife Feeding and Nutrition* by Charles T. Robbins. San Diego, CA: Academic Press, 1986.

*Wisconsin Deer and Bear Record Book* by Mark LaBarbera. Minneapolis, MN: ML Creations, 1984.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Bear Damage and Nuisance Problems in Wisconsin*. G3300.

*Controlling Deer Damage in Wisconsin*. G3083.

*Now It's Venison*. B2095.

*So You Got a Deer*. G1598.

The following is available from the Minnesota Department of Education, Division of Vocational-Technical Education.

### *Wildlife Conservation Programs of FFA*

The following is available from the Soil Conservation Service.

*Going Wild with Soil and Water Conservation*. PA1363.

### Periodicals

*Audubon Magazine*

*Conservation*

*Conservationist*

*Defenders*

*International Wildlife*

*National Geographic*

*National Wildlife*

*Sierra*

*Wisconsin Natural Resources*

## Computer Software

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Biology I.* Apple, IBM.

*Micro-Tutor: Conservation.* Apple, IBM.

The following are available from Yaker Environmental Systems, Inc.

*Biomes and Foodwebs.* Apple. 1983.

*Biomes II: Wilderness Webs.* Apple. 1986.

*Endangered Species.* Apple. 1985.

*Limiting Factors and Carrying Capacity.* Apple. 1983.

## Laboratory Resources

The following is available from Ohio Agricultural Education Curriculum Materials Service.

*Basic Field Techniques in Wildlife Management.* 9601M.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*The Responsible Hunter.* 11671 (16mm film, color, 23 minutes) or 11695 (VHS videotape, color, 23 minutes). Film Communicators, 1984.

*White-tailed Deer.* 01807 (16mm film, color, 39 minutes). Calvin Communicators, 1969.

*Wilderness World of Sigurd F. Olson.* 11618 (VHS videotape, color, 28 minutes). Film Media, 1980.

The following is available from the Encyclopaedia Britannica Educational Corporation.

*Problems of Conservation: Wildlife.* 2600 (16mm film or VHS videotape, 13 minutes).

The following are available from the Media Resources Center.

*Before You Hunt.* S58242F (16mm film, 27 minutes). Kansas State University, 1973.

*Coyote Caught Between Two Worlds.* S48446F (16mm film, 20 minutes). Forty Mile Productions, 1981.

*In Celebration of America's Wildlife.* S68702H (VHS videotape, 57 minutes). Commonwealth Films, 1986.

The following are available from Leisure Time Products.

*Successful Hunting the Whitetail Deer.* (VHS videotape.)

*Way of the Whitetail.* (VHS videotape.)

The following are available from Nasco.

*Managing Wildlife.* C10425N (Color filmstrip with cassette tape and script).

*Sharing Our Land with Wildlife.* C10193N (58-frame color filmstrip).

The following are available from Remington Arms Company, Inc.

*Wildlife and the Farm.* (16mm film, 28 minutes.)

*Wildlife on the Main Stem.* (VHS videotape with cassette, 27 minutes.)

The following are available from Vocational Education Productions.

*Agricultural Resources.* 1-901-136H (Sound filmstrip).

## Canning Industry and Food Processing (5-15 days)

This unit deals with the canning and food processing industries. Topics include career opportunities, food industry history, preservation techniques, nutrition and health issues, processing stages, and food industry regulations.

### *Objectives*

- To acquaint students with employment information and career opportunities in the canning and food processing industry
- To develop an understanding of various food preservation techniques
- To increase student understanding of how foods differ in nutritional content
- To increase student awareness of health risks and nutritional losses resulting from improper preservation methods
- To provide a basis for appropriate food preservation selection
- To develop an understanding of the stages involved in processing various vegetables
- To create an awareness of the need for effective food processing regulations by the government

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the food processing industry—and relate it to their personal needs and aspirations;
- list and describe significant highlights of the history in food preservation;
- identify and compare various food constituents;
- contrast the deteriorative factors leading to food spoilage;
- compare various food preservation methods;
- select various unit operations used in processing specific vegetables;
- explain the specific accomplishments of each unit of operation;
- comprehend significant food industry laws and regulations;
- discuss various food-borne illnesses that could originate in the food processing chain;
- choose appropriate procedures for cleaning equipment;
- analyze new methods of food preservation and list the new foods marketed; and
- identify various trade associations in the vegetable processing industry.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Food industry history
- Food preservation [Science]
  - Food stuff constituents
  - Deterioration factors
  - Cold processing and freezing methods
  - Dehydrating
- Food processing unit operations [Science]
  - Grading, cleaning, and packaging
  - Heat-processing methods
- Quality factors and measurements [Mathematics]
  - Testing equipment
  - Methods of use
- Legal aspects
  - Federal legislation
  - State legislation
  - Occupation Safety and Health Administration (OSHA)
- Sanitation [Social Studies]
  - Health rules
  - Local plant procedures
- Food industry trends and technology [Social Studies]

### *Motivational Activities*

- Take a field trip to a canning factory.
- Invite a food-processing plant manager to give a class presentation.
- Post bulletin board displays featuring topics related to this unit.
- View audiovisual materials on food processing.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Design a flow diagram of a processing operation.
- Measure the pH of canned materials.
- Review panel reports on various areas of food processing.
- Demonstrate food processing stages using commercial or home canning equipment.

### *Instructional Materials*

#### **Textbooks and References**

*Dictionary of Agricultural and Food Engineering* by Arthur W. Farrall and James A. Basselman. 2nd ed. Danville, IL: Interstate, 1979.



*Elementary Food Science* by John T. Nickerson and Louis J. Ronsivalli. 2nd ed. Westport, CT: AVI Publishing, 1980.

*Food Sanitation* by Rufus K. Guthrie. 2nd ed. Westport, CT: AVI Publishing, 1980.

*Food Science* by Norman N. Potter. 4th ed. Westport, CT: AVI Publishing, 1986.

*Introduction to Food Processing* by Pavel Jelen. Reston, VA: Reston Publishing, 1985.

*NEFCO Canning Book*. Edited by William C. Hurst. Athens, GA: Dixie Canner Equipment, 1984.

Available from American Association for Vocational Instructional Materials.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Additives in Our Food—Why Are They There?* B3051.

*Canning Meat and Poultry*. B3345.

*Canning Vegetables Safely*. B1159.

*Facts About Processed Meat*. A3041.

*Freezing Fruits and Vegetables*. B3278.

*Purchasing Fruits and Vegetables for Food Services*. C2813.

*Safe Canning Methods*. B2718.

The following is available from the Institute of Food Technologists.

*Condensed History of the Science and Technology of Thermal Processing*.

The following is available from the United States Department of Agriculture.

*Nutritive Value of Foods*. Home and Garden Bulletin #72.

The following is available from the Wisconsin Job Service.

*Fruit and Vegetable Processing Jobs*

### **Periodicals**

*Chilton's Food Engineering*

*Food Technology*

*Quick Frozen Foods International*

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Cash Vegetable Prices*. HS532.

*Markets for Potatoes*. HS518.

*Markets for Vegetables*. HS528.

*Vegetable Analysis and Outlook*. HS537.

*Vegetable Transportation Facts*. HS531.



## **Laboratory Resources**

The following is available from the Institute of Food Technologists.

### *Experiments in Food Science*

The following is available from AVI Publishing Company.

*Laboratory Manual in Food Preservation* by Marion L. Fields. 1977.

## **Films, Videotapes, and Slides**

The following are available from the Bureau of Audio Visual Instruction.

*Agribusiness Is Everybody's Business*. 06804 (16mm film, color, 21 minutes) or 11284 (VHS videotape, color, 21 minutes). Wisconsin Department of Agriculture, 1969.

*Behind the Grade Mark*. 09534 (16mm film, color, 20 minutes). U.S. Department of Agriculture, 1975.

*Bringing Meat to Market*. 08767 (16mm film, color, 11 minutes). Journal Films, 1972.

*Changing Foods in Changing Times*. 00992 (16mm film, color, 16 minutes). Cereal Institute, 1976.

*The Facts about Food Irradiation*. 11377 (VHS videotape, color, eight minutes). University of Wisconsin, Department of Agricultural Journalism, 1987.

The following is available from the Institute of Food Technologists.

*Food Additives - Who Needs Them?* (107 slides with script.)

The following is available from the Modern Talking Picture Service.

*Food: Its Science, Your Future*. (VHS videotape or 16mm film, 20 minutes.) Institute of Food Technologists, n.d.

The following is available from the Vocational Media Associates.

*Vegetables and Fruits*. 30813-93 (VHS videotape, program guide, and reproducible masters. In three parts: "Vegetables: Preparation Procedures," "Vegetables: Cooking Methods," and "Fruits: Preparation and Use."). 1985.

## Career Opportunities in Agriculture (10-15 days)

This unit deals with career opportunities related to agriculture. Topics include world agriculture, infrastructure, marketing interrelationships, career development strategies related to desired lifestyle, and individual aspirations and abilities.

### Objectives

- To acquaint students with employment and career opportunities in the agriculture industry
- To familiarize students with the seven clusters of agricultural employment (see "Subject Matter")
- To increase student comprehension of the world's need for agriculture
- To develop student understanding of the infrastructure that supports production agriculture at the national, state, and local levels
- To increase student understanding of how local agribusiness relates to agribusiness at the national and state levels
- To provide students with information on strategies for developing a career in agriculture
- To enhance student understanding of job preparation procedures
- To assist students in relating personal, career, and educational choices to desired lifestyle

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agriculture industry—and relate it to their personal needs and aspirations;
- recognize what is meant by the terms agriculture and agribusiness;
- explain why agriculture is considered the largest industry in the United States;
- identify several clusters of agricultural employment;
- describe the distribution and significance of agriculture on a world market level;
- understand the variety, complexity, and size of the agricultural enterprise in the United States;
- trace the channels linking agricultural producers to consumers;
- outline the nature and distribution of agriculture in Wisconsin;
- describe the marketing and distribution systems for agricultural products in Wisconsin;
- describe the nature and extent of agriculture in the local area;
- identify several basic principles for planning a career in agriculture;
- understand and apply job preparation procedures;
- list sources of information on agricultural careers; and
- explain the relationship between occupations, education, and lifestyle.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements

- Working conditions
- Opportunities for advancement
- Other factors
- Agricultural industry [Social Studies]
  - Market channels
    - Manufacturers
    - Suppliers
    - Producers
    - Processors
    - Distributors
  - Market commodities
    - Cattle and calves
    - Hogs
    - Dairy products
    - Grains and feedstuffs
    - Vegetables, nuts, and fruits
    - Oil crops
    - Fiber crops
    - Specialty crops
  - Farm commodity costs
    - Feed
    - Fertilizer
    - Seed/seedlings
    - Pesticides
    - Livestock
    - Taxes
    - Fuel
    - Machinery
    - Labor
    - Housing and structures
- Agricultural employment clusters (Refer to the Wisconsin Department of Public Instruction's publication, *A Guide to Curriculum Planning in Agriculture Education*.)
  - Agriculture Science/Production Management
  - Agriculture Processing/Food and Fiber
  - Agriculture Marketing/Distribution and Retail Services
  - Agriculture Supplies and Services
  - Agriculture Mechanization/Engineering and Technical Support Services
  - Agriculture Resources Management
  - Professional Employment in Agriculture
- International agriculture [Social Studies]
  - Demographics
    - Population rates
    - Food and fiber production
    - Food and fiber processing
    - Food and fiber distribution

- Land use
  - Crop land
  - Grazing land
  - Cities, roads, government usage, etc.
  - Forested land
  - Land tenure systems
- International food production
- Agriculture in the United States [Social Studies]
  - Food and fiber production enterprises
    - Dairy
    - Wheat
    - Corn
    - Specialty oil crops
    - Cotton and fiber crops
    - Tobacco
    - Beef
    - Hogs
    - Forest
    - Fish
    - Vegetables
    - Fruits and nuts
  - U.S. population
    - Total
    - Location and density
  - Food and fiber distribution
    - Production cycles
    - Jobs titles
- Agriculture in Wisconsin [Social Studies]
  - Food and fiber production
    - Dairy
    - Corn
    - Specialty oil crops
    - Tobacco
    - Beef
    - Hogs
    - Specialty animals
    - Fish
    - Forest
    - Vegetables
    - Fruits
  - Wisconsin population
    - Total
    - Location and density
  - Food and fiber distribution
    - Production cycles
    - Number of jobs

— Agricultural occupations in Wisconsin

Agronomist  
Certified seed grower  
Dairy herdsman  
Greenhouse manager  
Grain broker  
Agricultural economist  
Equine dentist  
Feed mill operator  
Land surveyor  
Machinist  
Soil conservationist  
Groundwater geologist  
Wildlife manager  
Rural sociologist  
International agricultural specialist

— Agricultural occupations in the county

Equipment operator  
Landscape architect  
Ova-transplant specialist  
Aerial crop duster  
Agricultural auctioneer  
Field sales representative

• Agriculture career preparation [Careers, Social Studies]

— Occupational survey

Description

1. nature of work
  - responsibilities
  - working conditions
  - location
2. job attractions
3. undesirable features
4. job outlook
5. related fields

Occupational requirements

1. educational requirements
2. personal qualifications
3. physical qualifications

Rewards

1. financial/income
2. security
  - pensions
  - insurance
  - tenure
3. personal satisfaction
  - prestige
  - self-expression
  - advancement
  - vacations and other benefits

— Career information sources

Schools

1. libraries

*Dictionary of Occupational Titles*

periodicals

newspaper classified ads

special bulletins

2. classes

Resource people

1. teachers

2. counselors

3. parents

4. employers

State employment agencies

On-the-job experience

— Individual student development

Personal traits

1. interests

2. abilities

3. aspirations

4. aptitudes

5. values

6. goals

Occupational planning

1. employment cluster list

2. occupational survey

3. preparatory courses

college prep

vocational/technical

general interest

special studies

postsecondary studies

Employment search

1. applications

2. resumes

3. letter writing

4. interviewing

poise/confidence

grooming/dress

promptness

communication skills

• Personal goals [Social Studies]

— Automobiles

— Housing

— Neighborhood

— Associates

— Income

— Real estate

— Investments

## Motivational Activities

- Create bulletin board displays featuring agricultural careers.
- Invite resource people to give class presentations.
- Ask guidance personnel to speak to the class about agricultural careers.
- Distribute career sheets, career profiles and other factual information about jobs in agriculture.
- Take field trips to area businesses and farms.
- Review job listings in the local newspaper.
- Create career posters.
- View films, videotapes, and slides on unit-related topics.

## Learning Activities

- View the film, *Agribusiness Is Everybody's Business*.
- Map local agricultural businesses.
- Visit one or more local businesses.
- Search want ads for jobs in agriculture.
- Map of agricultural production in Wisconsin.
- Visit with Job Service representative concerning job opportunities in agriculture.
- Interview agricultural workers in the community.
- Participate in job interview.
- Complete a Sextant profile.
- Complete a personal survey of "self".

## Instructional Materials

### Textbooks and References

- Agriculture*. Milwaukee, WI: Agriculture Sextant Systems, 1971. Available from National Farm Book Company.
- Agriculture in Our Lives* by Alfred H. Krebs. 5th ed. Danville, IL: Interstate, 1984.
- Careers in Agribusiness and Industry* by Archie A. Stone et al. 3rd ed. Danville, IL: Interstate, 1980.
- Careers in Conservation* by Henry E. Clepper. New York: John Wiley and Sons, 1979. Available from National Farm Book Company.
- Construction: Materials, Methods, Careers* by Jack M. Landers. Homewood, IL: Goodheart-Willcox, 1983.
- Dictionary of Occupational Titles*. Washington, DC: U.S. Department of Labor, Employment and Training Administration, 1978. Available from American Association for Vocational Instructional Materials.
- Exploring Agribusiness* by Ewell P. Roy. 3rd ed. Danville, IL: Interstate, 1980.
- Exploring Agriculture* by Roy L. Donahue and Everett F. Evans. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Exploring Occupations in Agribusiness and Natural Resources* by Samuel M. Curtis and Robert J. Mercer. New York: Gregg/McGraw-Hill, 1976.
- Food and Fiber for a Changing World: Third-Century Challenge to American Agriculture* by Gerald W. Thomas et al. 2nd ed. Danville, IL: Interstate, 1982.
- From School to Work* by Joseph J. Littrell. Homewood, IL: Goodheart-Willcox, 1984. Available from National Farm Book Company.

*Handbook of Agricultural Occupations* by Norman K. Hoover. 4th ed. Danville, IL: Interstate, 1985. Available from National Farm Book Company.

*Occupational Outlook Handbook*. Athens, GA: American Association for Vocational Instructional Materials, printed biannually.

*SOE Programs in Agriculture* by Harold R. Binkley and Charles W. Byers. Danville, IL: Interstate, 1984. Available from National Farm Book Company.

*Supervised Occupational Experience Manual* by Merle A. Carwin. 2nd ed. Danville, IL: Interstate, 1982. Available from National Farm Book Company.

*Teaching Vocational Agriculture-Agribusiness* by Harold R. Binkley and Rodney W. Rulloch. Danville, IL: Interstate, 1981. Available from National Farm Book Company.

*Working in Horticulture* by William B. Richardson. New York: McGraw-Hill, 1980. Available from National Farm Book Company.

*Yearbook of Agriculture* from the U.S. Department of Agriculture. Washington, DC: U.S. Government Printing Office, printed annually.

### **Bulletins and Pamphlets**

The following is available from Agriculture Sextant Systems, Inc.

*Exploring Your Future*

The following is available from the Cooperative Extension Service.

*Farm Husbands and Wives in Wisconsin: Work Roles, Decision Making and Satisfaction, 1962 and 1979*. R3147.

The following is available from the Wisconsin Agriculture Statistics Service.

*Wisconsin Agricultural Statistics*. Printed annually.

The following is available from the Land O'Lakes Agricultural Services.

*Visions*

The following are available from Vocational Agriculture Services.

*Applying for a Job*. U6001b.

*Motivating Workers in an Agricultural Business*. U6016.

*SOE Programs in Agriculture*. U7003.

### **Periodicals**

*Crops and Soils*

*Dairyman*

*The Farmer*

*Hoard's Dairyman*

*Wisconsin Natural Resources*

*Wisconsin Sportsman*



## Computer Software

The following are available from Hobar Publications.

*FFA Leadership Record.* Apple.

*FFA and Vo-Ag Record Summary and Analysis.* Apple, IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Effective Listening on the Job.* MSU103.

*Farm Credit System Careers.* HS681.

*Personal Motivation on the Job.* MSU105.

*Using Time on the Job Wisely.* MSU101.

*Working with People on the Job.* MSU104.

## Laboratory Resources

The following are available from Interstate Printers and Publishers, Inc.

*Instant Personal Problem Solving* by Albert C. Gubitz.

*Instant Writing Course* by Joseph J. Marks.

*Personal Information Book* by Louis Marucci.

*Succeeding on the Job* and *Supervising on the Job* by Patricia Mink Rath, Ralph E. Mason, and Lloyd S. Phipps.

## Films, Videotapes, and Slides

The following is available from the American Association for Vocational Instructional Materials.

*Choosing Careers Series*, CA111 (VHS videotape of five filmstrips). Individual filmstrips also may be ordered; titles and order numbers are as follows:

"Diploma or Dropout." CA106.

"The High of Higher Education." CA110.

"Job, Trade, or Profession." CA107.

"Training for a Trade." CA109.

"You and the Job Market." CA108.

The following are available from the Bureau of Audio Visual Instruction.

*Agribusiness Is Everybody's Business.* 06804 (16mm film, color, 21 minutes) or 11284 (VHS videotape, color, 21 minutes). Wisconsin Department of Agriculture, 1969.

*Agriculture and the Community.* 09240 (16mm film, color, 30 minutes) University of Wisconsin, Department of Agricultural Journalism, 1974.

*Career Planning.* 11799 (16mm film, color, 16 minutes) or 11800 (VHS videotape, color, 16 minutes). Journal Films, 1985.

*Food and Jobs: Wisconsin Agriculture.* 11370 (VHS videotape, color, 25 minutes) or 11627 (16mm film, color, 25 minutes). University of Wisconsin, Department of Agricultural Journalism, 1987.  
*Job Hunt.* 00694 (16mm film, color, 15 minutes). AIMS, 1975.  
*Job Interview Pro Bowl.* 04606 (16mm film, color, 20 minutes) or 10593 (VHS videotape, color, 20 minutes). Centron, 1979.

The following is available from the Grange Farm Film Foundation:

*Dynamic Careers Through Agriculture.* (16mm film, color, 28 minutes).

The following is available from Nasco.

*Four Women in Agribusiness.* Z9908N (VHS videotape). California State University-Chico, n.d.

The following are available from Venard Films.

*Careers in Agricultural Communications.* (VHS videotape, color, ten minutes.)  
*A Day in Agrichemicals Research.* (15 minutes.) The Dupont Company.

The following are available from Vocational Agriculture Services.

*Careers in Agriculture.* MF1008 (Two parts, filmstrip with cassette and program guide, 144 frames).  
*Human Relations in Agribusiness.* F392 (57-frame filmstrip).  
*Salesmanship in Agribusiness.* F391 (58-frame filmstrip).

The following is available from Vocational Education Productions.

*Careers in Fertilizer Sales.* 1-578-202H (Automatic) or 1-578-203H (Manual). (Slideset with cassette.)  
*Careers in the Fertilizer Industry.* 1-578-204H (Automatic) or 1-578-205H (Manual). (Slideset with cassette.)  
*Careers in Landscape Management.* 1-902-200H (Set of four filmstrips with cassettes and scripts).  
Individual filmstrips from the set also may be ordered, titles and order numbers are as follows:

"Entry-Level and Supervisory Careers." 1-902-202H.  
"Introduction to Careers in Landscape Management." 1-902-201H.  
"Sales and Estimation Careers." 1-902-204H.  
"Specialized Careers." 1-902-203H.

*A New Look at Careers in Agriculture.* 1-901-130H (Set of eight filmstrips with cassettes and scripts).  
Individual filmstrips from the set also may be ordered, titles and order numbers are as follows:

"Agricultural Production." 1-901-131H.  
"Agricultural Products." 1-901-134H.  
"Agricultural Resources." 1-901-136H.  
"Environmental Protection." 1-901-138H.  
"Equipment and Mechanics." 1-901-133H.  
"Forestry." 1-901-137H.  
"Ornamental Horticulture." 1-901-135H.  
"Supplies and Services." 1-901-132H.

## Computers in Agriculture (5-10 days)

This course is an introduction to microcomputers in agriculture. Topics include the selection and purchase of computer hardware and software and microcomputers' use in agriculture.

### *Objectives*

- To acquaint students with employment information and career opportunities in the computerized agriculture industry
- To introduce students to the basic components of computer systems
- To develop student understanding of the ways in which computers currently are being used in agriculture
- To provide students with practice in using computers for a broad range of agricultural tasks
- To provide students with a basis for evaluating computers and software for specific applications

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in agricultural computing—and to relate it to their personal needs and aspirations;
- explain computer hardware parts;
- explain different types of computer software;
- explain the factors involved when buying a computer; and
- demonstrate computer software usage in agricultural applications.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Describe what a computer is [Careers]
- Explain uses for a computer [Careers]
- Discuss computer operations [Mathematics, Science]
- Hardware [Careers]
  - Central processing unit
  - Input devices

- Keyboard
  - Mouse
  - Joystick
  - Voice input device
  - Light pen
  - Compact disk memory
  - Output devices
    - Cathode Ray Tube (CRT)
      1. television set
      2. monochrome monitor
      3. color monitor
    - Printer models
      1. width
      2. speed
      3. cost
      4. print quality
        - dot matrix
        - daisy wheel
        - laser
    - Special graphics boards
    - Printer buffers
    - Digitizer
  - Output and input devices
    - Floppy disk drive
    - Hard disk drive
    - Modem
    - Electronic circuit card or boards
  - Other hardware
    - Surge protectors
    - Cables
    - Switching devices
- Software [Career, Science]
    - Database management
    - Electronic spreadsheets
    - Word processing
    - Other general-purpose programs
    - Preprogrammed software
    - Disk operating system (DOS)
    - Language translator
    - Utility programs
  - Hardware and software considerations [Careers, Mathematics, Science]
    - Compatibility
    - Input devices
    - Memory requirements
    - Storage devices
    - Output devices
    - Special hardware

- Language translator
  - Operating system
  - Suitability
  - Documentation
  - Adequate testing
  - User support
  - Hardware arrangement and appearance
  - New or used hardware
- Computer purchase factors [Science]
    - Knowledge of computers
    - Expectations of computers
    - Software needs
    - Software compatibility
    - Future computer needs
    - Hardware and software maintenance
    - Software and hardware selection

### *Motivational Activities*

- Visit a computer store to examine hardware options, an agricultural operation that uses a computer, and a school computer laboratory.
- Demonstrate computer software programs.

### *Learning Activities*

- Become familiar with DOS.
- Write a letter using a word-processing program.
- Develop a program on an electronic spreadsheet.
- Develop a filing system using a database program.
- Take part in selecting computer hardware and software for classroom use.

### *Instructional Materials*

#### **Textbooks and References**

- Agriculture Computer—Guide and Directory*. Danville, IL: Interstate, 1984. Available from National Farm Book Company.
- Agriculture Computer Programming* by Richard A. Levins and Charles W. Walden. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- All About On-Farm Computing*. Edited by Dave Skoloda and Russ Bennett. Milwaukee, WI: AgriData Resources, 1983.
- Computer Concepts for Agribusiness* by Michael W. Woolverton. New York: AVI Publishing, 1985.
- Computers on the Farm: Farm Uses for Computers—How to Select Software, Hardware, On-Line Information Sources in Agriculture*. New York: Gordon Press, 1986.
- Developing Computer Skills: Operating Principles and Software Applications for Apple IIe, IIc and IIgs* by Eric C. Egerston. Danville, IL: Interstate, n.d.
- The Farm Computer* by Fred E. Sistler. Reston, VA: Reston Publishing, 1984. Available from National Farm Book Company.

*Microcomputer Applications for Students of Agriculture* by William Camp et al. Danville, IL: Interstate, 1987.

*Microcomputing in Agriculture* by James Legacy et al. Reston, VA: Reston Publishing, 1984.

### **Bulletins and Pamphlets**

The following is available from the American Association for Vocational Instructional Materials.

*Understanding Microcomputers*. 801 (Manual), 801TK (Teacher's key). 1987.

The following are available from the Cooperative Extension Service.

*A Computer for Your Farm*. NCR247.

*Computers of the Farm*. AF2277.

*Using Microcomputers on the Farm*. A3220.

The following is available from Vocational Agriculture Services.

*Introduction to Computers in Agriculture*. U6023. 1981.

*Selecting Agricultural Computer Software*. U6025. 1982.

### **Periodicals**

*Agricultural Computing*

*Computers and Electronics in Agriculture*

*Farm Smart: The Journal of Computerized Farm Management*

*PC Magazine*

### **Computer Software**

The following is available from ACS Software Publishing.

*Instructional Unit—Computer Applications in Agriculture*. ACS 288. Apple.

The following is available from Hobar Publications.

*Easy Inventory*. Apple, IBM, TRS.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Introduction to Computers in Agriculture*. Apple, IBM.

The following is available from Ag Ed Network, AgriData Resources, Inc.

*Computers for Crop Management*. HS214.

*Computers for Crop Production*. HS212.

*Computers for Dairy Management*. HS216.

*Computers for Farm Accounting*. HS59.

*Computers for Livestock Records*. HS210.

*Computers for Use in Management.* HS60.  
*Computers for Use on the Farm.* HS58.  
*Computers to Keep Crop Records.* HS213.  
*Computers to Keep Dairy Records.* HS215.

#### **Laboratory Resources**

Computers  
Monitors  
Keyboards  
Printer  
Computer disks  
Computer paper

#### **Films, Videotapes, and Slides**

The following is available from the Bureau of Audio Visual Instruction.

*Computers in Society.* 10018 (16mm film, color, 17 minutes). Encyclopaedia Britannica Educational Corporation, 1984.

The following is available from the Ideal Pictures Film Library.

*The New Hired Hand.* (16mm film, color, 27 minutes.) Allis Chalmers, 1973.

The following is available from the International Business Machines Corporation.

*About Computers.* (16mm film, ten minutes.) 1979.

*About Information.* (16mm film, ten minutes.)

#### **Equipment and Facilities**

Computers  
Printers  
Software for database, word processing, and electronic spreadsheet



## Concrete Masonry Technology (10 days)

This unit deals with concrete technology. Topics include career opportunities; the history and uses of concrete; estimating, placing, and finishing concrete; and concrete masonry construction.

### *Objectives*

- To acquaint students with employment information and career opportunities in the concrete industry
- To develop student understanding of the history, manufacture, and types of Portland cement
- To develop student awareness of the fundamental relationships among cement, water, and aggregates
- To provide students with a background on the properties desired in plastic and hardened concrete
- To develop student understanding of the types and uses of concrete
- To develop student awareness of the standard tests used to determine the quality of concrete
- To acquaint students with the methods of specifying ready-mixed concrete for specific uses
- To increase student awareness of the proper use and care of tools used to place and finish concrete
- To prepare students to determine the amount of concrete needed for a job
- To demonstrate to students the proper placing procedures under various weather conditions, including use of reinforcement, finishing techniques, and control joints
- To demonstrate to students appropriate concrete masonry construction techniques

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job description, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the concrete technology industry—and relate it to their personal needs and aspirations;
- describe the background and history of the concrete industry, including the development of concrete and cement usage;
- identify the various uses and types of concrete;
- describe the processes involved in the manufacture of Portland cement;
- explain the fundamental relationships among cement, water, and aggregates;
- design and construct specific projects using concrete, according to appropriate practices;
- demonstrate proper use and care for tools used in placing and finishing concrete; and
- describe the proper characteristics of high-quality concrete.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions



- Opportunities for advancement
- Other factors
- Historical background of the Portland cement and concrete industries
- Basic information about concrete [Science]
  - Cement, water, and aggregates
  - Mixing procedure
  - Additives
    - Air entrainment agents
    - Calcium chloride
    - Others
  - Standard quality tests
- Uses of concrete
  - General agricultural uses
  - Special uses
- Concrete estimating [Mathematics]
  - Ready-mixed concrete
  - Job-mixed concrete
- Placing and finishing concrete
  - Tools needed
  - Forming
  - Reinforcement
  - Finishing and curing procedures
  - Special finishes
  - Repairing the concrete finish
  - Cold- and hot-weather curing
- Concrete masonry construction
  - Mortar mixes
  - Block placement
  - Special reinforcement
  - Joint finishing

### *Motivational Activities*

- Take field trips to a ready-mix plant and a construction site.
- View videotapes, films, and slides on the concrete industry.
- Post bulletin board displays featuring topics related to this unit.
- Use computer software to determine the amount of concrete needed for a variety of jobs.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Calculate the amount of cement and aggregates needed for a concrete driveway.
- Set up laboratory exercises to mix, quality test, place, finish, and cure concrete.

## *Instructional Materials*

### **Textbooks and References**

- Advanced Masonry Skills* by Richard T. Kren, Sr. 2nd ed. Albany, NY: Delmar, 1983. Available from National Farm Book Company.
- Concrete and Concrete Masonry* by Donald Ahrens et al. St. Paul, MN: Hobar, 1976.
- Concrete Technology* by George R. White. 3rd ed. Albany, NY: Delmar, 1977. Available from Hobar Publications.
- Construction: Principles, Materials and Methods* by John L. Schmidt, Walter H. Lewis, and Harold B. Olin. 5th ed. Danville, IL: Interstate, 1983. Available from National Farm Book Company.
- Masonry Simplified: Tools, Materials and Practice* by James R. Dalzell and Gilbert Townsend. 3rd ed. Chicago: American Technical Society, 1973.
- Masonry Skills* by Richard T. Kren, Sr. 2nd ed. Albany, NY: Delmar, 1982. Available from National Farm Book Company.
- Mechanics in Agriculture* by Lloyd J. Phipps. 3rd ed. Danville, IL: Interstate, 1978.
- Modern Agricultural Mechanics* by T.J. Wakeman. Danville, IL: Interstate, 1977. Available from National Farm Book Company.
- Modern Masonry* by Clois E. Kicklighter. South Holland, IL: Goodheart-Willcox, 1985. Available from National Farm Book Company.
- Safety for Masons* by Richard T. Kren, Sr. Albany, NY: Delmar, 1979. Available from Hobar Publications.

### **Bulletins and Pamphlets**

The following are available from Hobar Publications.

*Concrete Construction Worksheets*. #541. (Set of ten, each in a pad of 25). Also available in individual pads of 25, titles and order numbers are as follows:

- "Bicycle Stand." #538.
- "Car Parking Bumper." #539.
- "Driveway Marker." #537.
- "Hog Trough." #533.
- "Mixing Concrete." #531.
- "1 × 1 Patio Block." #535.
- "1 × 2 Patio Block." #536.
- "Shoe Scraper with Concrete Base." #540.
- "Slump Test." #532.
- "Splash Block." #534.

*Quality Concrete Manual*. #164. rev. 1971.

*Recommended Practices for Laying Concrete Block*. #PA043M. rev. 1980.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Concrete Improvements for Farm and Home*. 707X. Illinois Vocational Agriculture Service, n.d.

*Recommended Practices for Building with Concrete Masonry*. 706X. Illinois Vocational Agriculture Service, 1980.

The following is available from Randolph Concrete Products, Inc.

*Randolph Slatted Floor Systems*

**Periodicals**

*Concrete Construction*

**Computer Software**

The following are available from Hobar Publications.

*Bill of Material Record.* Apple.

*Concrete and Related Review.* Apple, IBM, TRS, Macintosh.

*Mixing and Estimating Concrete.* Apple.

**Films, Videotapes, and Slides**

The following are available from Hobar Publications.

*Block.* MAS040 (Three sound filmstrips with teacher's guide and student work sheets. Filmstrip titles: "The Block Corner," "The Block Pier," and "Laying Block to the Line").

*Brick—Part A.* MAS020 (Three sound filmstrips with teacher's guide and student work sheets. Filmstrip titles: "Laying Brick," "The Rock-Back Lead," and "The Straight Lead").

*Brick—Part B.* MAS030 (Three sound filmstrips with teacher's guide and student work sheets. Filmstrip titles: "The Corner," "The Pier," and "Laying to the Line").

*Hand Tools and Mortar.* MAS010 (Three sound filmstrips with teacher's guide and student work sheets. Filmstrip titles: "Basic Hand Tools," "Mixing Mortar by Hand," and "Spreading Mortar").

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Concrete Masonry.* 7001S (55 color slides and script). 1962.

*Mr. Quality Concrete.* 7003S (40 color slides). 1965.

## Conservation and Soils (7 days)

This unit deals with increasing the students' awareness of the importance of soil conservation. Topics include soil conservation careers, protection and maintenance of soils, agricultural philosophical positions, and agricultural environmental issues.

### Objectives

- To acquaint students with employment information and career opportunities in the conservation industry
- To emphasize the need for agriculture as a part of the total environmental system
- To assist students in designing a conservation program
- To highlight the need for conservation practices in agriculture

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the conservation industry—and relate it to their personal needs and aspirations;
- describe the role of agriculture in conservation;
- compare natural and agricultural systems;
- list the methods necessary to maintain artificial systems;
- identify the philosophies of agriculturalists and environmentalists;
- analyze agriculture's contribution to environmental problems and prepare at least one solution for each problem; and
- explain why farmers should be concerned with pollution problems.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Career
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Agriculture is an unbalanced and artificial system [Science]
  - Natural system versus agricultural system
    - Natural system
    - 1. plant and animal diversity
    - 2. natural enemies of plants and animals
    - 3. tolerances of living organisms (e.g., weeds more drought-resistant than corn)

Agricultural system

1. monoculture
  - regional insect infestations
  - wildlife reduction
2. Broad-spectrum pesticides
3. Economic emphasis on production

— Common agricultural methods

Tillage  
Pesticides  
New varieties  
Fertilizer applications

● Agricultural and environmental philosophies

- Agriculturalist beliefs
- Environmentalist beliefs
- Mutual understanding

● Agricultural contributions to environmental problems [Science]

— Crop land drainage

Siltation  
Fertility  
Pesticides  
Soil structure  
Approved soil and water conservation practices

1. vegetative cover for class V and VIII land
2. filter cover along streams and lakes
3. other soil and water conservation measures

— Feedlot and barnyard run-off

Point and nonpoint pollution  
Surface and groundwater pollution  
Approved soil and water conservation practices

1. location of feedlots and barnyards
2. manure storage
3. animal confinement
4. filter cover along streams and lakes

— Water supply management

Well contamination  
Groundwater filtration  
Approved soil and water conservation practices

1. regular manure removal
2. concrete manure storage area
3. location of feedlots and barnyards
4. location of septic systems and wells

— Pesticide usage considerations

Impact on wildlife  
Water supply contamination  
Applicator injury  
Residue impact  
Approved pesticide application practices

1. follow label directions

2. limit application frequency
  3. dispose of containers properly
  4. use safety equipment
  5. select single-target chemicals when possible
  6. practice approved conservation methods
  7. rotate crops
  8. practice biological pest control
- Sewage sludge fertilizer
- Completes the nutrient cycle
  - Provides water and nutrients to crops
  - Avoid using sludge containing heavy metals, which are commonly found in industrial waste
  - Take precautions in applying sewage sludge to soils used to provide food for human consumption
- Effects of "clean farming" on wildlife
- Mowing or burning fencerows destroys protective cover, travel lanes, and nesting sites for wildlife
  - Draining potholes and straightening streams disturbs cover
  - Spring plowing and fenced stream banks reduce erosion
- Odors, rodents, and other nuisance problems
- Causes
  - Approved sanitation practices
    1. remove manure regularly
    2. spread manure properly
    3. practice sound sanitation methods
    4. use rodenticides judiciously
    5. reduce standing water using proper drainage techniques

### *Motivational Activities*

- Visit farms using sound erosion and pollution control measures.
- Test streams or lakes polluted by agricultural run-off for pH, nitrate, dissolved oxygen, and phosphate levels.
- Invite conservation specialists—such as representatives from the Wisconsin Department of Natural Resources and the Soil Conservation Service, game manager, county planner, and public health official—to give class presentations.
- Visit zoning enforcement offices.
- List plant and animal species found in the natural system and those found in the agricultural system.
- Display pictures and life cycles of natural enemies of plant and animal species.
- Display a list of uses and container labels from various pesticides.
- View videotapes, films, and slides on unit-related topics.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Design a feedlot that includes safeguards to prevent erosion.
- Collect and test water samples to determine their suitability for drinking.
- Display equipment used to protect a person who handles and applies pesticides.
- Discuss the research results of using sewer sludge as a fertilizer.

## Instructional Materials

### Textbooks and References

- Approved Practices in Soil Conservation* by Duane A. Bosworth and Albert B. Foster. 5th ed. Danville, IL: Interstate, 1983.
- Environmental Conservation* by Raymond F. Dasmann. 5th ed. New York: John Wiley and Sons, 1984. Available from National Farm Book Company.
- A Guide to the Study of Environmental Pollution* by W.A. Andrews. New York: Prentice Hall, 1972.
- Our Soils and Their Management* by Roy L. Donahue, Roy H. Follett, and Rodney L. Tulloch. 5th ed. Danville, IL: Interstate, 1983.
- Profitable Soil Management* by Leo L. Knuti. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Sand County Almanac* by Aldo Leopold. New York: Sierra Club Books/Ballantine, 1966.
- Soil Science and Management* by Edward J. Plaster. Albany, NY: Delmar, 1985. Available from Hobar Publications.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Compendium of Research Reports on Use of Non-Traditional Materials for Crop Production*. A9NTM. Supplement. A9NTM-1.
- Conservation Tillage for Corn*. A3091.
- Conservation Tillage for Corn Handbook*. A3379.
- Conservation Tillage for Corn Teaching Packet*. A3379-1.
- Conservation Tillage for Dairy Farms*. A3370.
- Livestock Yard Runoff Control Systems*. A3077.
- Nonpoint Pollution: Agricultural Runoff in Wisconsin*. G2979.
- Nonpoint Source Pollution: Land Use and Water Quality*. G3025.
- Pesticides in Groundwater: How They Get There; What Happens to Them; How to Keep Them Out*. G3213.
- Wisconsin's Soil and Water Conservation Program*. G3230.

The following is available from Hobar Publications.

- Our Land and Its Care*. P120.

The following are available from the Soil Conservation Service.

- Animal Waste as a Pollutant or Resource*. Wisconsin Brochure. 1976.
- Conservation Tillage Systems*. Wisconsin Brochure. 1980.
- Plant Materials for Conservation*. Program Aid 1219. 1979.
- Soil Erosion—The Work of Uncontrolled Water*. Ag Information Bulletin AIB260. Rev. 1981.

### Periodicals

- Conservation*  
*Journal of Soil and Water Conservation*



*Soil and Water Conservation News*  
*Water Pollution Control Federation Journal*  
*Wisconsin Natural Resources*

**Computer Software**

The following is available from Agri-Education, Inc.

*Conservation Tillage.* Apple, IBM.

The following are available from Hobar Publications.

*Soil Conservation, Surveying, and Related Review.* Apple, IBM.

*Soil Evaluation, Fertility, and Related Review.* Apple, IBM.

*Tillage and Related Review.* Apple, IBM.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Conservation.* Apple, IBM.

*Micro-Tutor: Soil Science.* Apple, IBM.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Soils.* Apple, IBM.

**Films, Videotapes, and Slides**

The following are available from the Bureau of Audio Visual Instruction.

*Conservation and Balance in Nature.* 06443 (16mm film, color, 18 minutes). International Film Bureau, 1965.

*Cry of the Marsh.* 07350 (16mm film, color, 13 minutes). Snyder, 1970.

*Environment.* 00586 (16mm film, color, 29 minutes). BFA Educational Media, 1971.

*Man's Impact on His Environment.* 02996 (16mm film, color, 22 minutes). Ward's Nature Science, 1969.

*Runoff: Land Use and Water Quality.* 01765 (16mm film, color, 22 minutes). University of Wisconsin, Department of Agricultural Journalism, 1978.

*Tragedy of the Commons.* 08657 (16mm film, color, 30 minutes). Holt, Reinhart and Winston, 1971.

The following are available from Vocational Education Productions.

*Ecology and the Agricultural Environment.* 1-573-131G (49-frame filmstrip with cassette and script).

*Soil and the Agricultural Environment.* 1-573-135G (47-frame filmstrip with cassette and script).

The following are available from Vocational Media Associates.

*Conservation Tillage.* 30798-93 (Two parts, sound filmstrips or slides with program guide).

*Soil: Its Meaning for Man.* 30919-93 (Two parts, sound filmstrips with program guide).

*Soil: The Growth Medium.* 30194-93 (Four parts, sound filmstrips with program guide).



## Cooperative Education Programs (30-45 days)

This unit deals with the cooperative education program for students in agriculture. Topics include introduction to cooperative education, career planning, world of work in agriculture, employer and employee relations, leadership, communications, decision making, employee attitudes, employee cooperation, and on-the-job training agreements.

### Objectives

- To enhance student competency in the employment area of agricultural industry placement
- To develop student understanding of the world of work and its relationship to classroom instruction
- To help students explore ways to relate successfully to employers, supervisors, coworkers, and classmates
- To provide students with an opportunity to demonstrate leadership abilities in the classroom, on the job, and in FFA activities
- To improve students' ability to communicate effectively
- To enhance student planning and decision-making skills
- To encourage student development of good work habits and attitudes in the workplace
- To increase students' ability to work cooperatively with others
- To assist students in the development of a training agreement for job placement

### Competencies

At the conclusion of this unit, students will be able to

- demonstrate competency in the employment area of agricultural industry placement;
- exhibit an understanding of the world of work and its relationship to classroom instruction;
- relate to the expectations of their employer, supervisor, fellow employees, coordinator, and classmates;
- demonstrate leadership abilities in the classroom, on the job, and in FFA activities;
- demonstrate the ability to communicate effectively, whether oral or written;
- understand the employment scope of the agriculture industry;
- demonstrate the ability to set goals and make decisions;
- exhibit good work habits and attitudes in the classroom and at the cooperative training station; and
- work well with others and independently.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Agricultural employment clusters
  - Agriculture Science/Production Management
  - Agriculture Processing/Food and Fiber
  - Agriculture Marketing/Distribution and Retail Services
  - Agriculture Supplies and Services
  - Agriculture Mechanization/Engineering and Technical Support Services
  - Agricultural Resources Management
  - Professional Employment in Agriculture

- Employment in agriculture [Career, Mathematics, Science, Social Studies]
  - Personal skills and attitudes
  - Technical skills and knowledge
  - Application of education to employment
- Maintaining agricultural employment
  - Employee expectations
  - Supervisor expectations
  - Employee relationships
  - Coordinator expectations
  - Classmate relationships
- Leadership on the job
  - Classroom responsibilities
  - Employment expectations
  - FFA leadership responsibilities
- Communication on the job
  - Written communication
  - Oral communication
- Occupational planning
  - Career decision-making process
  - Agricultural employment opportunities
  - Personal career assessment
  - Developing agricultural career objectives
  - Assessing agricultural opportunities
  - Identifying agricultural job opportunities
- Occupational placement
  - Selecting an agricultural job
  - Developing a training agreement
  - Identifying employer requirements
- Maintaining occupational placement
  - Employee work habits
  - Employee attitude
  - Establishing employee rapport
  - Cooperation on the job
  - School policies for cooperative education

### *Motivational Activities*

- Take field trips to cooperative training stations, educational institutions, banks, and other related industry.
- Make available resource materials for specific occupations.
- View slides, videotapes, and films related to unit topics.
- Conduct class cooperative projects in marketing, sales, special events, and other FFA activities.
- Demonstrate individual and group instructional techniques.

## Learning Activities

- Take part in public-speaking activities or events.
- Organize or take part in a class sales activity.
- Play an agricultural marketing game.
- Participate in an FFA judging contest.
- Develop FFA Week promotional activities.
- Engage in activities specific to your career interests.

## Instructional Materials

### Textbooks and References

- Careers in Agribusiness and Industry* by Archie A. Stone. 3rd ed. Danville, IL: Interstate, 1980.
- Cooperative Occupational Education and Work Experience in the Curriculum* by Ralph E. Mason, Lorraine T. Furtado, and Stewart W. Husted. 4th ed. Danville, IL: Interstate, 1987.
- Dictionary of Occupational Titles*. Washington, DC: U.S. Department of Labor, Employment and Training Administration, 1978. Available from American Association for Vocational Instructional Materials.
- Exploring Agri-Business* by Ewell P. Roy. 3rd ed. Danville, IL: Interstate, 1980.
- From School to Work* by Joseph J. Littrell. South Holland, IL: Goodheart-Willcox, 1987.
- Handbook of Agricultural Occupations* by Norman K. Hoover. 4th ed. Danville, IL: Interstate, 1985. Available from National Farm Book Company.
- Human Relations in Agribusiness*. Edited by John Hillison, John Crunkilton, and Jasper S. Lee. New York: Gregg/McGraw-Hill, 1980. From the Career Preparation for Agriculture/Agribusiness Series.
- An Introduction to Agribusiness Management* by Walter J. Wills. 2nd ed. Danville, IL: Interstate, 1979.
- Job Seeking Guide* by Albert J. Pautler. Albany, NY: Delmar, 1979.
- Selling in Agribusiness*. Edited by Larry E. Miller and Jasper S. Lee. New York: Gregg/McGraw-Hill, 1979. From the Career Preparation for Agriculture/Agribusiness Series.
- Succeeding in the World of Work* by Grady Kimbrell and Ben S. Vineyard. 4th ed. Bennett and McKnight, 1986.
- Supervised Occupational Experience Manual* by Merle A. Carwin. 2nd ed. Danville, IL: Interstate, 1982. Available from National Farm Book Company.
- Working in Agricultural Industry*. Edited by Jasper S. Lee and Max L. Amberson. New York: Gregg/McGraw-Hill, 1978. From the Career Preparation for Agriculture/Agribusiness Series.
- Working with Animal Supplies and Services*. Edited by Roy D. Dillion and Jasper S. Lee. New York: Gregg/McGraw-Hill, 1980. From the Career Preparation for Agriculture/Agribusiness Series.

### Bulletins and Pamphlets

The following are available from the Instructional Materials Service.

- Agricultural Chemical Sales and Servicer*. 0052.
- Agricultural Machinery Repairer—Equipment*. 0035.
- Dairy Farm Worker*. 0039.
- Feed Sales and Servicer*. 0032.
- Fertilizer Sales and Servicer*. 0033.

*Group Instruction Handbook for Agribusiness Training.* 0010.  
*Horse Farm Employee.* 0053.  
*Horticultural Occupations.* 0031A.  
*Meat Processing Plant Employee.* 0038B.  
*Milk Processing Plant Employee.* 0038A.  
*Seed Sales and Servicer.* 0047.  
*Veterinary Assistant.* 0036.  
*Wildlife Conservation Employee.* 0050.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Agribusiness, Is It for Me?* 9003b. 1975.  
*Agricultural Business Sales and Marketing.* 811X. Missouri Instructional Materials Service, 1984.  
*Succeeding on Your First Job.* 9004M. 1977.

The following are available from the Vocational Studies Center.

*Achieving Success in Small Business.* ETC150.  
*Steps to Starting a Small Business.* ETC200.

The following is available from the Wisconsin Department of Industry, Labor and Human Relations, Equal Rights Division.

*Guide for the Employment of Minors.* 1986.

The following is available from the Wisconsin Job Service.

*Labor Standards*  
*Make the Most of a Job Interview*  
*Unemployment Benefits*

#### Periodicals

*Farm Journal*  
*Successful Farming*  
*Wisconsin Agriculturist*

#### Computer Software

The following are available from Hobar Publications.

*Agriculture Marketing and Commodity Futures.* Apple.  
*Dairy Ration Balancing.* IBM.  
*FFA and Vo-Ag Record Summary and Analysis.* Apple, IBM.  
*The Sale Manager.* Apple.  
*SOEP Enterprise and Record Book.* IBM.  
*SOEP Record and Record Summary Package.* Apple, IBM.  
*SOEP Sample Program and Key.* Apple, IBM.

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources Inc.

*Introduction to SOEP.* CLF611.

*SOE.* CLF600.

*SOE (DIR).* CLF610.

### **Laboratory Resources**

The following is available from Agri-Farm Publications, Inc.

*The Farming Game*

The following is available from the Wisconsin Association of Vocational Agricultural Instructors.

*Record and Plan Book for Supervised Occupational Experience Program*

### **Films, Videotapes, and Slides**

The following is available from Cornell University.

*Opportunities in Agriculture and Life Sciences.* (16mm film, 33 minutes.)

The following is available from the Grange Farm Film Foundation.

*Pioneering in the '80s.* (16mm film, 27 minutes.)

The following is available from the University of Wisconsin-River Falls, Agricultural Education Department.

*United States Farm Report with Orion Samuelson on University of Wisconsin-River Falls Careers and Programs in Agriculture.* (30 minutes.)

## **Cooperatives (10-20 days)**

This unit deals with the organization and management of cooperatives. Topics include career opportunities; cooperatives as a type of business organization; the history, philosophy, economic impact, function and operation, financing, tax policy, and government regulation of cooperatives; duties of cooperative members, managers, and board members; distribution of dividends; and patronage refunds.

### *Objectives*

- To acquaint students with employment information and career opportunities in the cooperative industry
- To develop student understanding of the advantages and limitations of the cooperative as a form of business organization
- To acquaint students with the history of cooperatives in the United States
- To develop student appreciation for the magnitude of the cooperative enterprise in the United States
- To inform students of the characteristics that distinguish the cooperatives from other forms of business
- To help students recognize differences among various types of cooperatives
- To increase student awareness of the range of products and services that can be purchased or marketed through cooperatives
- To develop student understanding of how cooperatives are structured, controlled, and financed
- To provide students with information on the responsibilities and duties of cooperative members
- To prepare students to make informed decisions concerning membership in specific cooperatives

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the cooperative industry—and to relate it to their personal needs and aspirations;
- recognize the advantages and limitations of the cooperative as a form of business organization;
- trace the history of cooperatives in the United States;
- appreciate the magnitude of the cooperative enterprise in the United States;
- identify the characteristics that distinguish cooperatives from other forms of business;
- recognize differences among various types of cooperatives;
- appreciate the range of products and services that can be purchased at or marketed through cooperatives;
- demonstrate an understanding of how cooperatives are structured, controlled, and financed;
- recognize the responsibilities and duties of cooperative members; and
- make informed decisions concerning membership in specific cooperatives.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- **Careers**
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- **Historical background [Social Studies]**
  - Original, informal cooperative activities
  - People involved in the cooperative movement
  - Principles identified by the Rochdale Principles
  - Cooperative activity in the United States
  - Cooperative activity in Wisconsin
  - Origin and extent of cooperative activity at the local and county level
- **Business organizations in the free enterprise system [Social Studies]**
  - Methods used to provide goods and services to people
  - Principles that distinguish a cooperative from other forms of business
  - Descriptions and examples of local noncooperative business organizations
  - Business investment rationale
  - Cooperative organization rationale
- **Organization of the cooperative [Social Studies]**
  - Types of agricultural cooperatives
  - Purpose of each type of cooperative
  - Organization procedures for cooperatives
  - Community benefits from cooperatives
  - Scope and volume of business by cooperatives
- **Extent of cooperative business activity [Social Studies]**
  - Principal member activities through cooperatives
  - Cooperative business fiscal value
  - Number of farmer cooperatives in the state and nation
  - State rank in the volume of business and number of members
- **Cooperative governing structure [Social Studies]**
  - Control of cooperatives
  - Cooperatives governing operation
  - Ownership and control of local, regional, and national cooperatives
  - Centralized and federated types of cooperatives
  - Board of directors' responsibilities
  - Cooperative officer election and responsibilities
  - Cooperative manager and employee selection
  - Reasons for cooperative failure



● Financing cooperatives [Social Studies]

- Revolving capital
- Types of stock
- Certificates of indebtedness
- Banks for cooperatives
- Commercial banks
- Alternative credit sources
- Dividend payments
- Cooperative taxation

*Motivational Activities*

- Take field trips to local cooperatives.
- Invite a cooperative manager, the board member, or cooperative member to speak to the class.
- Tour a regional cooperative.
- View films, videotapes, and slides on unit topics.
- Post bulletin board displays on topics related to this unit.

*Learning Activities*

- Participate in a Supervised Agricultural Experience in a local cooperative business.
- Compile a list of cooperatives in the community and classify each as a service, marketing, purchasing, or supply business.
- Compile a list of career opportunities in cooperatives, agriculture, insurance, finance, health care, housing, consumer goods and services, and other fields.
- Compile a list of services cooperatives perform, such as marketing dairy products and grain and selling farm supplies.
- Perform a short skit portraying an annual cooperative meeting, using correct parliamentary procedure.
- Present to the class a report on youth camps or conferences you have attended.
- As a class project, interview a manager of a cooperative, a manager of a corporation, a member of a partnership, and an owner of an individually owned business and compare notes on how these businesses operate.

*Instructional Materials*

*Textbooks and References*

- Agricultural Cooperatives—Their Why and Their How* by Glynn McBride. Westport, CT: AVI Publishing, 1986.
- American Institute of Cooperation Yearbook*. Washington, DC: American Institute of Cooperation, published annually.
- Cooperative Growth, Trends, Comparison, and Strategies*. Washington, DC: Farmer Cooperative Service, United States Department of Agriculture, 1973.
- Cooperatives: Development, Principles and Management* by Roy P. Ewell. 4th ed. Danville, IL: Interstate, 1981.
- Cooperatives in Agriculture* by David W. Cobia. Englewood Cliffs, NJ: Prentice Hall, 1989.
- Cooperatives in Our Private Enterprise System*. Washington, DC: American Institute of Cooperation, n.d.



*Guide to Cooperative Careers.* Ann Arbor, MI: North American Students of Cooperation, 1985.  
*How We Organize to Do Business in America to Satisfy the Needs of People.* 3rd ed., rev. Washington, DC: American Institute of Cooperation, 1982.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Cooperatives: Principles and Practices.* A1457.  
*Reducing Financial Costs and Financial Management Problems of Cooperatives.* R2791.

The following are available from the United States Department of Agriculture.

*Advising People About Cooperatives.* CIR 29, revised 1987.  
*Bookkeeping Forms Your Co-op Needs.* CIR 19, revised 1978.  
*The Cooperative Approach to Crafts.* CIR 33, revised 1985.  
*The Cooperative Approach to Outdoor Recreation.* CIR 32, 1984.  
*Cooperative Benefits and Limitations.* CIR 1 Section 3, 1983.  
*Cooperative Communications.* CIR Section 11, 1988.  
*Cooperative Management.* CIR Section 8, 1981.  
*Cooperative Member Responsibilities and Control.* CIR Section 7, 1983.  
*Cooperative Organization and Structure.* CIR 1 Section 5, 1987.  
*Cooperatives—Distinctive Business Corporations.* CIR 3.  
*Cooperatives in Agri-Business.* CIR 5, revised 1987.  
*Employees Help Co-ops Serve.* CIR 17, reprinted 1981.  
*Farmer Cooperative Publications.* CIR 4, revised 1988.  
*Guidelines Co-op Employees Need.* CIR 18, reprinted 1982.  
*How to Start a Cooperative.* CIR 7, 1985.  
*Is a Cooperative in Your Future?* CIR 10, 1985.  
*Manager Holds Important Key to Co-op Success.* CIR 16, reprinted 1981.  
*Measuring Co-op Directors.* CIR 15, reprinted 1981.  
*Members Make Co-ops Go.* CIR 12, reprinted 1983.  
*Opportunities in Cooperatives—A Leader's Program for Youth.* CIR 25, revised 1983.  
*Organizations Servicing Cooperatives.* CIR 1 Section 5, 1987.  
*Organizing and Conducting Cooperatives' Annual Meetings.* CIR 21, reprinted 1986.  
*Recruiting and Training Co-op Employees.* CIR 36, 1987.  
*Tax Treatment of Cooperatives.* CIR 23, revised 1984.  
*Understanding Capper-Volstead.* CIR 35, revised 1985.  
*Understanding Your Cooperatives.* CIR 6, 1983.  
*Using Co-op Members' Money.* CIR 13, reprinted 1986.  
*What Are Cooperatives?* CIR 11, revised 1986.  
*What About Patronage Refunds?* CIR 9, revised 1984.  
*What Co-op Directors Do.* CIR 14, reprinted 1985.

The following is available from the Wisconsin Department of Agriculture, Trade and Consumer Protection.

*Economics and Geography of Wisconsin Cooperatives*. 1987.

#### Periodicals

*Cooperative Farmer*  
*Cooperative Partners*  
*Farm Cooperatives*

#### Computer Software

The following is available from ACS Software Publishing.

*Co-op Quiz*. ACS 220. Apple.

#### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Commodity Organization Membership*. HS109  
*Cooperative Principles*. HS656.  
*Co-ops: A Type of Business*. HS655.  
*Dairy Cooperative Membership*. HS112.  
*Farm Organization Membership*. HS108.  
*Fruit Cooperative Membership*. HS116.  
*Grain Cooperative Membership*. HS111.  
*Vegetable Cooperative Membership*. HS114.

#### Films, Videotapes, and Slides

The following is available from the Bureau of Audio Visual Instruction.

*Cooperative Farmer in Eastern Germany*. 07242 (16mm film, color, 16 minutes). Films, Inc., 1969.

The following is available from Interstate Printers and Publishers, Inc.

*Cooperatives: An Economic Alternative*. 2806 (VHS videotape). University of Wisconsin-Ea. Claire, Media Development Center, n.d.

The following is available from Vocational Education Productions.

*Agricultural Cooperatives*. 8-810-132H (Filmstrip with cassette).

The following is available from the Wisconsin Dairies Cooperative.

*Cooperatives: The Farmers Way*. (16mm film, color, 24 minutes.) American Institute of Cooperation, 1981.

The following are available from the Wisconsin Federation of Cooperatives.

*Cooperative Business.* (VHS videotape, approx. ten minutes.) American Institute of Cooperation, 1989.

*The Cooperative Story.* (VHS videotape, approx. ten minutes.) American Institute of Cooperation, 1989.

*Cooperatives: An Economic Alternative.* (VHS videotape, 26 minutes.) University of Wisconsin-Eau Claire, Media Development Center, 1985.

*Cooperatives—Partners in Trade.* (VHS videotape, approx. ten minutes.) Agricultural Cooperative Service, 1988.

*Cooperatives Today.* (VHS videotape, approx. ten minutes.) American Institute of Cooperation, 1989.

*Cooperatives—Working for All of Us.* (VHS videotape, approx. ten minutes.) American Institute of Cooperation, 1988.

*Why Cooperatives?* (VHS videotape, approx. ten minutes.) American Institute of Cooperation, 1989.

## Corn Science (10-40 days)

This unit deals with various aspects of the corn science industry. Topics include corn uses and production areas, corn plant development, management decisions, seed corn production, safety guidelines, and career opportunities.

### *Objectives*

- To acquaint students with employment information and career opportunities in the corn science industry
- To introduce students to the different types, uses, and production areas of corn
- To develop student appreciation for the economic and social significance of corn as an agricultural crop
- To develop student understanding of the development of corn from seed to maturity
- To develop student understanding of the practices and principles involved in seed corn production and their significance to agriculture
- To enable students to make and implement more effective management decisions concerning the planting, cultivation, harvesting, storage, and marketing of corn
- To develop student appreciation for the need to adhere to safety guidelines in all aspects of agricultural production

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the corn industry—and relate it to their personal needs and aspirations;
- identify the different types of corn;
- locate corn growing areas;
- explain different methods of hybrid seed corn production;
- determine proper herbicides, insecticides, and fungicides for corn production;
- recognize the different methods of corn harvesting and storage;
- explain the different marketing techniques for corn;
- exercise safety measures relevant to corn production and chemical applications;
- conduct a plant population count; and
- identify corn growth stages and kernel development.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Introduction to corn [Science]
  - Uses of corn
  - Types of corn
  - Special types of corn
  - Growing areas
    - Corn Belt states
    - Other high-producing states
  - Climatic and soil requirements
  - Corn growth and development
  - International implications, distribution, and trade
- Seed corn selection
  - Hybrid production
    - Systems
    - Relative maturities
    - Variety selection
      1. silo corn, crib, and shelled corn
      2. commercial production
- Corn culture [Mathematics, Science]
  - Methods of seed bed preparation
  - Fertilization
  - Planting
  - Weed control
    - Chemical
    - Mechanical
  - Insect control
  - Disease control
  - Harvesting
    - Silage
      1. chopping
      2. preservation
      3. fermentation
      4. silage additives
      5. grain
  - Storage methods
    - High-moisture corn
    - Drying corn
    - Crib corn
- Marketing [Careers]
  - Local markets
  - International markets
  - Futures market

## *Motivational Activities*

- Take field trips to
  - corn test plots,
  - corn drying and storage operations,
  - Farm Progress Days,
  - an experimental research farm, and
  - an agricultural equipment dealer.
- Post bulletin board displays featuring topics related to this unit.
- View films, filmstrips, slides, and videotapes about corn science and production.
- Make available to the class computer software programs on corn production.
- Visit a farm with a high-moisture corn set-up.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Design a corn production program.
- Collect and label samples of different kinds of corn.
- Conduct moisture tests on corn.
- Perform a yield check on corn.
- Take part in a corn-yield contest.
- Sow corn plots using different row spacing and plant populations.

## *Instructional Materials*

### **Textbooks and References**

- Approved Practices in Crop Production* by Elwood A. Brickbauer and William P. Mortenson. 2nd ed. Danville, IL: Interstate, 1978.
- A Compendium of Corn Diseases* by M.C. Shurtleff. St. Paul, MN: American Phytopathological Society, 1980.
- Corn and Corn Improvement*. Edited by George F. Sprague. Madison, WI: American Society of Agronomy, 1977.
- Crop Production* by Richard Delorit and Louis Greub. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Grain Marketing in Wisconsin* by Elwood A. Brickbauer et al. Madison, WI: University of Wisconsin, College of Agricultural and Life Sciences, n.d.
- Modern Corn Production* by Samuel R. Aldrich and Earl R. Leng. 2nd ed. Champaign, IL: A & L Publications, 1986.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Conservation Tillage for Corn Handbook*. A3379. Teachers Packet. A3379-1.
- Corn Diseases*. A7800603 (Volume 1), A7800604 (Volume 2).
- Corn Fertilization*. A3340.
- Corn Insects below Ground*. A2047.
- Corn Pest Management for the Midwest: A Guide for Pest and Problem Diagnosis*. NCR98.
- Corn Rootworms*. A3328.

*The European Corn Borer.* A1220.

*Eyespot of Corn.* A3175.

*Field Crop Herbicide Manuals for Dealers and Custom Applicators.* A2296.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Seed Production of Corn, Soybeans, and Small Grains.* 1013M. 1977.

The following is available from the Pennsylvania Instructional Materials Service.

*Approved Practices for Corn Production*

The following is available from Pioneer Hi-Bred International, Inc.

*Corn Management/Diagnostic Guide*

The following are available from Vocational Agriculture Services.

*Diseases of Soybeans and Corn.* X830.

*Insect Pest Identification of Corn, Soybeans, and Alfalfa.* X870.

#### Periodicals

*Crops and Soils*

#### Computer Software

The following is available from Hobar Publications.

*Corn and Soybean Review.* Apple, IBM, TRS, Macintosh.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Corn Production.* Apple, IBM

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Corn.* Apple, IBM.

#### On-line Computer Networks

The following is available from Ag Ed Network, AgriData Resources, Inc.

*Corn Basis Chart, 10-Year Average.* FE2149.

*Corn Charts and Technical Information.* HS241.

*Corn Future Prices.* ADN29.

*Corn Market Advice.* ADN49.

*Corn Marketing Decisions.* HS242.

*Corn Price Outlook.* ADN38.

*Corn Starter Reports.* ADN2.  
*Corn Transportation Facts.* HS231.  
*Cost of Producing Corn.* HS177.  
*Markets for Corn.* HS223.  
*Pricing Corn Before Produced.* HS550.  
*Pricing Corn Held in Storage.* HS551.

#### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Corn From Bag to Bin.* 05818 (Part I) and 05819 (Part II) (16mm film, color, 13 minutes each part).  
University of Wisconsin, Department of Agricultural Journalism, 1964.  
*Corn: The Plant with Ears.* 08447 (16mm film, color, 11 minutes). Centron, 1972.  
*For the Rest of Your Life (Anhydrous Ammonia).* 00371 (16mm film, color, 13 minutes). Iowa State University, 1973.  
*Seeds of Plenty.* 07696 (16mm film, color, 18 minutes). Wisconsin Crop Improvement, 1970.

The following is available from Ohio Agricultural Education Curriculum Materials Service.

*Seed Production of Corn, Soybeans, and Small Grains.* 1014S (70 color slides with script).

The following is available from Teaching Aids, Inc.

*Corn Production.* B-262 (Ten filmstrips with cassettes and study guides).

The following are available from Vocational Agriculture Services.

*Corn Problems, Part 1: Planting to Knee High.* S732-1 (66-frame slideset with study guides) or F732-1 (66-frame filmstrip with study guides).  
*Corn Problems, Part 2: Knee High to Tasseling.* S732-2 (41-frame slideset with study guides) or F732-2 (41-frame filmstrip with study guides).  
*Corn Problems, Part 3: Tasseling to Maturity.* S732-3 (45-frame slideset with study guides) or F732-3 (45-frame filmstrip with study guides).  
*Recognizing Corn Herbicide Injury.* F732-4 (57-frame slideset) or F732-4 (57-frame filmstrip).

The following is available from Venard Films.

*The Remarkable Story of Hi-Lysine Corn.* (16mm film, color, 18 minutes.) Crow's Hybrid Corn Company, n.d.



## Dairy Goat Science (5-15 days)

This unit deals with the dairy goat industry. The topics included are career opportunities, anatomy, breed identification, feeding, housing, health, fitting and showing, herd development and improvement, and marketing of dairy goat products.

### *Objectives*

- To acquaint students with employment information and career opportunities in the dairy goat industry
- To develop student understanding of the nature and distribution of the dairy goat industry in the United States
- To provide students with practice in identifying the various dairy and angora goat breeds
- To develop student understanding of goat anatomy and organ functions
- To provide students with instruction in evaluating and selecting breeding and replacement stock
- To develop student understanding of goat breeding systems and sire selection strategies
- To facilitate student inquiry into approved practices for managing dairy and angora goat herds
- To provide students with information on how to produce high-quality goat milk and fiber
- To introduce students to procedures for marketing goat products successfully

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the dairy goat industry—and relate it to their personal needs and aspirations;
- describe the history and current status of the goat industry;
- identify several food and fiber products derived from goats;
- name and describe the functions of parts of a goat's anatomy;
- identify factors that affect the quality of milk and fiber, and identify management strategies for each;
- outline procedures for properly fitting and showing goats;
- milk a dairy goat correctly;
- shear an angora goat correctly;
- evaluate a goat for herd replacement or breeding stock;
- develop an efficient feeding program for goats;
- perform acceptable management skills correctly;
- describe the proper housing and equipment requirements for raising goats;
- explain how to maintain a healthy herd;
- summarize production and price trends in the goat industry; and
- describe methods of marketing goats and goat products.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- The goat industry [Social Studies]
  - History
  - Distribution of goats
  - Economic importance of goats
  - Career opportunities
- Breeds of goats (characteristics, history, breed headquarters, registration requirements)
  - Angora
  - Dairy
    - Alpine
    - LaMancha
    - Toggenburg
    - Nubian
    - Saanen
  - Spanish
  - Other
- Goat anatomy (functional importance) [Science]
  - General identification
  - Skeleton
  - Muscular system
  - Respiratory system
  - Skin
  - Fiber
  - Circulatory system
  - Excretory system
  - Digestive system
  - Nervous system
  - Endocrine glands
  - Male reproductive system
  - Female reproductive system
- Herd development [Science]
  - Animal selection and evaluation
    - Foundation stock selection
    - Sire selection and evaluation
    - American Dairy Goat Association dairy goat scorecard for does
    - American Dairy Goat Association dairy goat scorecard for bucks

- Breeding
  - Breeding systems
    1. heat detection
    2. reproductive performance
  - Artificial insemination versus natural breeding
  - Genetic advancement
- Fitting and showing goats
  - Proper handling procedures
  - Clipping
  - Competition in the show ring
  - American Dairy Goat Association showmanship scorecard
- Feeding principles and practices for goats [Mathematics, Science]
  - Essential nutrients
  - Nutrient requirements of goats
  - Metabolic processes
  - Sources of feed stuffs
  - Goat rations
- Management techniques
  - Catching, handling, controlling
  - Grooming and clipping
  - Breeding
  - Kidding
  - Postnatal care
  - Milking
  - Disbudding/dehorning
  - Castration
  - Identification
  - Deodorizing
  - Foot trimming
  - Wattle removal
- Housing and equipment
  - Range/pasture
  - Loose housing
  - Confinement housing
  - Bedding
  - Insulation
  - Ventilation
  - Temperature
  - Milking facilities
  - Feed and bedding storage
  - Manure handling
  - Fences

- Goat diseases and parasites [Science]
  - Herd health control and prevention programs
  - Identification and treatment
- Management records [Mathematics]
  - Herd health records
  - Breeding records
  - Registration records
  - Dairy herd improvement records
- Marketing goats [Social Studies]
  - Registered breeding stock
  - Mohair
  - Milk and milk products
  - Meat

### *Motivational Activities*

- Take field trips to a local goat farm, goat product processing plant, or agribusiness associated with the goat industry.
- Make available up-to-date instructional media on goats such as films, slides, videotapes, magazines, and computer programs.
- Attend a goat show or sale.
- Invite guest speakers to address the class on a topic of the goat industry.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Take part in judging activities.
- Fit animals for show.
- Exhibit animals at fair.
- Perform a mastitis test.
- Perform several tests to determine butterfat content.
- Shear an Angora goat.
- Perform management practices, such as milking, grooming, clipping, castration, deodorizing, identification, dehorning, foot trimming, and wattle removal.
- Sample goat's milk and cheese products.
- Identify the parts of a goat using a live goat.
- Identify goat breeds using live animals or pictures.

### *Instructional Materials*

#### **Textbooks and References**

- All About Goats* by Lois Hetherington. 2nd ed., rev. Ipswich, England: Farming Press, 1982. Available from Nasco.
- Dairy Goats: Selecting, Fitting and Showing* by Alice Hall. rev. San Bernadino, CA: Hall Press, 1977. Available from National Farm Book Company.
- Exhibition and Practical Goatkeeping* by Joan Shields. Columbia, SC: Spur Publications, 1977.

- The Goatkeeper's Veterinary Book* by Peter Dunn. 2nd ed. Ipswich, England: Farming Press, 1987. Available from Nasco.
- Handbook of Livestock Management Techniques* by Richard A. Battaglia and Vernon B. Mayrose. Edina, MN: Burgess International, 1981.
- Management and Diseases of Dairy Goats* by Samuel B. Guss. Scottsdale, AZ: Dairy Goat Journal Publishing, 1977. Available from Nasco.
- Modern Livestock and Poultry Production* by James R. Gillespie. 2nd ed. Albany, NY: Delmar, 1985.
- Practical Guide to Small-scale Goatkeeping* by Billie Luisi. Woodstock, NY: Overlook Press, 1985.
- Raising Goats for Milk and Meat* by Rosalee Sinn. Little Rock, AR: Heifer Project International, 1983. Available from Nasco.
- Raising Milk Goats the Modern Way* by Jerome D. Belanger. Charlotte, VT: Garden Way Publishing, 1975. Available from Nasco and National Farm Book Company.
- Raising Milk Goats Successfully* by Gail Luttmann. Charlotte, VT: Williamson Publishing, 1986. Available from Nasco.
- Sheep and Goat Science* by M.E. Ensminger and R.O. Parker. 5th ed. Danville, IL: Interstate, 1986.

#### Bulletins and Pamphlets

The following is available from the Cooperative Extension Service

*Identifying and Controlling Flies for Dairy, Beef and Other Livestock*. A2118.

The following are available from the Minnesota Extension Service.

*Angora Goats in Minnesota*. AG-FO-2533.

*Extension Goat Handbook*. AG-MI-2329.

#### Periodicals

*Countryside*  
*Dairy Goat Journal*

#### Computer Software

The following are available from ACS Software Publishing.

*Computer Assisted Ration Formulation*. Apple.

*Feed Formulation*. Apple, IBM.

The following are available from Hobar Publications.

*Livestock Diseases and Parasites*. Apple.

*Livestock Diseases, Parasites and Related Review*. Apple, IBM, TRS, Macintosh.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Feeds and Feeding*. Apple, IBM.

### Films, Videotapes, and Slides

The following is available from Instructional Materials Service.

*Breeds of Sheep and Goats.* 5022 (28 color slides with script).

The following is available from Media Resources Center.

*Dairy Goat—Basic Management.* (16mm film, color, 11 minutes.) Genus Capra Films, 1978.

The following are available from Photocom.

*Breeding and Kidding Management.* 30-689 (VHS videotape, 49 minutes).

*Care of Kids: Birth to Weaning.* 30-690 (VHS videotape, 38 minutes).

*Dairy Goat Facilities.* 30-688 (VHS videotape, 44 minutes).

*Introduction to Dairy Goats.* 30-759 (VHS videotape, 19 minutes).

*Maintaining Herd Health and Milking Management.* 30-691 (VHS videotape, 41 minutes).

*Marketing and Obtaining Financing.* 30-692 (VHS videotape, 28 minutes).

The following is available from Vocational Education Productions.

*The Livestock Judging Slide Set No. 7: Dairy Goats.* 1-428-207H (57 color slides).

## Dairy Herd Testing (10-15 days)

This unit deals with dairy herd testing. Topics include career opportunities and keeping, reading, and using production records.

### Objectives

- To acquaint students with employment information and career opportunities in the dairy herd testing industry
- To develop student appreciation of the value of regular herd testing
- To enhance student ability to maintain accurate and useful dairy production records
- To provide students with guidelines for choosing appropriate methods for keeping production records
- To develop student understanding of information used in herd records
- To acquaint students with ways to use production records to make effective herd management decisions

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the dairy herd testing industry—and relate it to their personal needs and aspirations;
- understand the importance of testing the dairy herd;
- keep dairy production records;
- describe how records are computed for uniform and equitable production comparisons;
- explain why different milk tests vary;
- increase their knowledge of the use of dairy production records;
- analyze yearly herd records; and
- describe how records aid in management.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job description
  - Training requirements
  - Working conditions
  - Opportunity for advancement
  - Other factors
- Importance of dairy herd testing [Social Studies, Careers]
  - Economic improvement
  - Genetic improvement

- Testing procedures [Science]
  - Types of tests
  - Protein tests
  - Milkfat tests
  - Milk sample collection
  - Barn sheet completion
  - Other recordkeeping concerns
- Computing records [Mathematics]
- Dairy herd test variations [Science]
- Production record information
  - Cow identification
  - Sample day production
  - Cow information
  - Lactation totals to date
  - Calving age/expected 305-day lactation totals
  - Herd rank
  - Reproductive status
- Dairy herd improvement record uses [Mathematics]
  - Herd analysis
  - Individual performance analysis
  - Disease control
  - Official registry records
  - Culling
  - Goal setting and evaluation
  - Breeding information
  - Feeding
  - Milk quality
  - Marketing products

### *Motivational Activities*

- Take a field trip to a dairy laboratory.
- Invite a Dairy Herd Improvement supervisor to speak to class.
- Participate in the Wisconsin Junior Dairymen's Association's (WJDA's) program of activities.
- View the videotape of the Dairy Herd Improvement Association testing program as well as other audiovisual materials.
- Invite local top producer to speak on use of production records.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program in dairying.
- Demonstrate correct procedure for sampling milk, testing milk for fat content, or taking simple tests for mastitis.
- Calculate sample records for individual cows and the herd on a monthly and yearly basis.
- Create bulletin board displays on different types of tests.



- Interview a dairy herd tester.
- Test milk sold commercially for butterfat content.
- Compare and contrast butterfat contents of various milk products sold to consumers.

## *Instructional Materials*

### **Textbooks and References**

- Dairy Cattle Science* by M. E. Ensminger. 2nd ed. Danville, IL: Interstate, 1980.
- Dairy Farm Management* by Thomas Quinn. Albany, NY: Delmar, 1980. Available from National Farm Book Company, 1982.
- Dairy Production* by Clarence E. Bundy and Ronald V. Diggins. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Wisconsin Junior Dairyman's Association Manual*. Madison, WI: Department of Public Instruction, printed annually.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Extra Services Available from DHI*. A3050.
- How DHI Cow Records Are Calculated*. A2989.
- How to Interpret and Use DHI Records—A Cow's Milk Fat Test*. A2642.
- Sampling Milk and Reporting Information for DHIA Tests*. A2152.
- Using DHI Records for Culling*. A2765.
- Weighing and Sampling Milk for DHIA in Pipeline Milking Systems*. A2453.
- What Is a DHI Record?* A2416.
- What to Expect When You Join DHIA*. A2735.
- Your DHI Rolling Herd Average (RHA)*. A3244.
- Your DHI 305-Day ME Location Average (LA)*. A3258.

The following are available from the Wisconsin Dairy Herd Improvement Cooperative.

- Herd Summary Curriculum Unit*
- Herd Summary Report*
- Herd Summary User's Handbook*
- WDHI Curriculum Unit*

### **Periodicals**

- Dairy Herd Management*
- Hoard's Dairyman*

### **Computer Software**

The following is available from Hobar Publications.

- Dairy Production and Related Review*. Apple, IBM, TRS, Macintosh.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Dairy Ration Master.* Apple.

*Micro-Tutor: Dairy Production.* Apple, IBM.

#### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Computers for Dairy Improvement.* HS216.

*Dairy Cooperative Membership.* HS112.

#### Films, Videotapes, and Slides

The following is available from Babson Brothers Dairy Research Service.

*Making your Cows Worth More.* (16mm film, color, 30 minutes.) 1977.

The following are available from the Bureau of Audio Visual Instruction.

*Improving Milk Quality: Managing Your Environment.* 11911 (VHS videotape, color, 18 minutes).

University of Wisconsin, Department of Agricultural Journalism, 1987.

*Improving Milk Quality: Using Monitoring Systems.* 11912 (VHS videotape, color, 18 minutes). Uni-

versity of Wisconsin, Department of Agricultural Journalism, 1987.

#### Equipment and Facilities

Butterfat test kit

Timer

SHANE reagent (if available)

Milk testing glassware

BDI test

## Dairy Marketing (15 days)

This unit deals with dairy marketing, including processing, distributing, and retailing dairy products to the consumer. Marketing skills and their relation to the agricultural producer and agribusinessperson are emphasized. Dairy marketing career opportunities are an integral part of the course.

### Objectives

- To acquaint students with employment information and career opportunities in marketing dairy industry
- To help students analyze the regulations, support programs, and marketing orders and understand their relationship to the pricing system of dairy products
- To enhance student comprehension of the relationship of imports and exports and their effects on the supply and demand of dairy products
- To help students understand the role cooperatives play in the marketing of dairy products
- To help students understand the government's role and its effect on the pricing, standards, and supply of dairy products
- To help students distinguish between and compare dairy product processing techniques and operations
- To develop student understanding of marketing channels and the costs involved

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the marketing dairy industry—and relate it to their personal needs and aspirations;
- identify the leading states in milk and dairy products production;
- describe the major marketing channels for dairy products;
- define basic terms relative to dairy marketing;
- identify and list the stages in which milk moves from the producer to the consumer;
- identify the various forces influencing prices of fluid milk and other dairy products;
- list significant laws and regulations pertaining to milk and milk products;
- recognize current ways of expanding dairy product exports and the role that each segment of the dairy industry may play;
- demonstrate an understanding of how supply and demand affects dairy product imports and exports;
- identify examples of milk marketing cooperatives and describe how they operate;
- analyze government dairy support programs; and
- demonstrate an understanding of how dairy markets are expanded and how new dairy products are researched and developed.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements

- Working conditions
- Opportunities for advancement
- Other factors
- Market importance of milk and dairy products [Social Studies]
  - The farm value of dairy products
  - The per capita consumption of dairy products
- Centers of production of dairy products [Social Studies]
  - Factors that affect the location of the dairy enterprise
  - Leading states in milk production
  - Leading states in the production of butter, cheese, and other dairy products
- Market channels for milk and dairy products
  - Three stages in which milk moves from the producer to the consumer
  - Choice of market outlet
  - Assembling dairy products from farms
- Milk pricing and regulations [Social Studies]
  - The history of milk pricing
  - Factors that influence prices of fluid milk
  - Federal milk marketing orders
  - State milk control
  - Cooperative marketing of dairy products
  - Sanitary regulations of milk and dairy products
  - Standards and grades of milk and dairy products
  - State trade practice laws in the sale of fluid milk
  - The price support program
- Profitability of dairy processing firms [Social Studies]
  - The two methods of gauging profitability
- Selling milk for manufacturing purposes [Social Studies]
  - Number and size of milk manufacturing plants
  - Condenseries and powder plants
  - Ice cream and other frozen dairy desserts
  - Cream, butter, and nonfat dry milk
  - Cheese factories
  - Condensed and evaporated milk
- Imports and exports [Social Studies]
  - Import quotas on dairy products
  - Dairy products export potentials
  - Ways of expanding dairy product exports
- Outlook for dairy products [Social Studies]
  - Effect on dairy production on future trends
  - Factors that contribute to the changes in usage of dairy products
  - The role of government programs in the outlook for dairy products
  - The role of foreign trade in the outlook for dairy products

## Motivational Activities

- Take field trips to milk processing plants.
- Visit a milk marketing organization.
- Invite milk marketing representatives to give a class presentation.
- Post bulletin board displays featuring topics related to this unit.
- View films, videotapes, and slides on marketing of dairy products.

## Learning Activities

- Participate in a Supervised Agricultural Experience program.
- Design a flow diagram of the market channels for milk and dairy products.
- Give a panel report on the pricing methods used in the market.
- Give a panel report on the employment opportunities in dairy product marketing.
- Assemble a display of the different dairy products.
- Analyze the factors that influence the price of fluid milk.
- With a group, develop a new government policy for controlling the surplus of milk.
- Demonstrate marketing principles by selling dairy products to students.

## Instructional Materials

### Textbooks and References

- Dairy Cattle Science* by M. Eugene Ensminger. 2nd ed. Danville, IL: Interstate, 1980. Available from National Farm Book Company.
- Dairy Production* by Ronald V. Diggins and Clarence E. Bundy. Engelwood Cliffs, NJ: Prentice Hall, 1984.
- Marketing Farm Products* by Geoffrey Seddon Shepherd and Gene A. Futrell. Ames, IA: Iowa State University Press, 1982. Available from National Farm Book Company.
- Marketing of Agriculture Products* by Richard Louis Kohls. New York: Macmillan, 1985. Available from National Farm Book Company.
- Modern Marketing of Farm Products* by William Peter Mortenson. Danville, IL: Interstate, 1979.
- The Science of Providing Milk for Man* by John R. Campbell and Robert T. Marshall. New York: McGraw-Hill, 1975.

### Bulletins and Pamphlets

The following are available from Cooperative Extension Service.

- Aggregative Analysis of U.S. Dairy Policy*. R3191.
- Analysis of the Effects of Federal Milk Orders on the Economic Performance of U.S. Milk Markets*. R2897.
- The Delicate Supply-Demand Balance*. A2972.
- Economic Analysis of Dairy Marketing Organization Services*. R2895.
- Economic Analysis of Farm to Milk Plant Hauling*. R2889.
- Herdsmanship for Dairy Cattle Shows*. A2799.
- How Parity Prices and Support Levels Are Determined*. A2974.
- Insect Control in Food Handling and Processing Establishments*. A2518.
- Milk Pricing and Pooling in California*. A3318.
- The Milk Producer's Cost-Price Outlook for 1979*. A2976.
- Pricing Milk to Farmers on a Component Basis*. A2977.
- Using Whey on Agricultural Land - A Disposal Alternative*. A3098.
- What Determines the Individual Dairy Farmer's Milk Price under a Federal Order*. A2978.
- What Is a Federal Marketing Order?* A2973.

*What Is the M-W Price Series and Why Is It Being Questioned?* A2985.  
*Why Your DHI and Plant Tests Might Be Different* A2570.

#### Periodicals

*Agri-View*  
*The Country Today*  
*Dairy: The Magazine for the Dairy Herd Improvement Association*  
*Wisconsin Agriculturist*

#### On-line Computer Networks

The following are available from the Ag Ed Network, Agri-Data Resources, Inc.

*Market Impact of Programs*. HS123.  
*Marketing Alternatives*. CSU297.  
*Marketing Dairy Beef*. HS434.  
*Markets for Fed Cattle*. HS386.  
*Markets for Feeder Cattle*. HS399.

#### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction

*Cheesemaking, from the Feel of the Curd to the Tang on the Tongue*. 02000 (16mm film, color, 16 minutes). University of Wisconsin, Photographic Media Center, 1978.  
*Dairy—Farm to Door*. 01695 (16mm film, color, 11 minutes.). AIMS, 1965.

## Dairy Product Manufacturing (10-20 days)

This unit deals with the manufacturing of milk into various dairy commodities. Topics include career opportunities, physical properties of milk, composition and nutrition, dairy processes, and manufacturing procedures.

### Objectives

- To acquaint students with employment information and career opportunities in the dairy product manufacturing industry
- To acquaint students with the nature and distribution of dairy production and manufacturing in the United States
- To develop an appreciation for the contribution the dairy industry makes to the economy at the national, state and local level
- To develop an understanding of the composition of milk and of the variables affecting its quality
- To describe and illustrate the various tests used to assess the composition and quality of milk
- To increase student awareness of how milk is handled and processed into various dairy products
- To provide students with criteria for assessing the quality of milk and milk products
- To develop student understanding of the marketing and distribution methods used by the dairy industry
- To facilitate student inquiry into long-term trends affecting the dairy industry
- To help students identify potential environmental problems associated with milk processing

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the dairy product manufacturing industry—and relate it to their personal needs and aspirations;
- locate the major dairy producing and manufacturing areas of Wisconsin and the United States;
- identify the leading counties, states, and nations in the production of milk and dairy products;
- discuss, orally or in writing, the importance of dairying to their area of the state;
- explain, orally or in writing, several factors affecting the composition of cow's milk;
- list the major components of milk and their percentages and describe the significance of each component;
- identify off-flavors in milk;
- describe and give reasons for variations in the color of milk;
- perform laboratory tests to determine the physical properties of milk;
- compare the common dairy processes involved in the handling of fluid milk, the purpose of each process, and how it relates to the total handling of the milk;
- discuss, orally or in writing, the importance of dairy products to the national, state, and local economy;
- group dairy products according to a standard classification form;
- explain the fundamentals involved in manufacturing dairy products;
- evaluate a sample of a manufactured dairy product using a standard scorecard;



- describe the several marketing methods associated with dairy products and the economic effects of supply and demand;
- relate the long-term trend in the consumption of each dairy product, the number of plants manufacturing that product, and the proportion of the milk supply being used for manufacturing it; and
- discuss problems involved with the disposal of waste products.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunity for advancement
  - Other factors
- Survey of the dairy industry [Careers]
  - Location of major dairy producing and manufacturing areas
  - Importance of dairying locally
- Physical properties of milk [Science]
  - Off flavors and color variations
  - Laboratory quality tests
- Composition and nutritive value of milk [Science]
  - Major components of milk
  - Factors affecting milk composition
  - Milk components percentages
  - Nutrient value
- General dairy processes [Science]
  - Fluid milk handling
  - Milk processing equipment principles, use, and care
  - Waste products disposal
- Dairy product manufacturing industries [Science, Social Studies]
  - Economic importance
  - Dairy product grading
  - Manufacturing fundamentals involved
  - Laboratory testing
  - Finished product composition
  - Finished product evaluation
  - Supply and demand effect on marketing
  - Product consumption and manufacturing
- Dairy industry education [Careers]
  - Post-high school education available
  - Informal training programs



### *Motivational Activities*

- Take field trips to dairy manufacturing plants, dairy-testing laboratories, and dairy equipment manufacturing plants.
- Invite guest speakers from related fields of the industry to address the class.
- View films, videotapes, and slides on dairy product manufacturing.
- View pamphlets and displays on topics related to this unit.
- Participate in the state contest for dairy products.
- Conduct appropriate tests to discover the students' interests and aptitudes.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Make a graph or map of the milk and dairy producing areas.
- Chart a comparison of whole milk with manufactured dairy products.
- Study reports of factors influencing the composition of milk.
- Do laboratory exercises, such as butterfat test, freezing point, and viscosity.
- Judge milk for off-flavors.
- Disassemble and assemble dairy equipment or mock-ups.
- Produce dairy products, such as cheese, yogurt, butter, and ice cream, in the laboratory and have them graded.
- Prepare displays of cheese trays as a means of advertising the product.
- Collect containers used in the dairy product manufacturing industry.

### *Instructional Materials*

#### **Textbooks and References**

- Cheese and Fermented Milk Foods* by Frank V. Kosikowski. 2nd ed. Brooktondale, NY: F.V. Kosikowski and Associates, 1982.
- Dairying and Dairy Policy in the 1980's* by Karen McConnell Brooks. Washington, DC: American Enterprise Institute for Public Research, 1984.
- The Milk Makers* by Gail Gibbons. New York: Macmillan, 1985.
- Milk Production: A Four-State Earnings Comparison* by Boyd M. Buxton. Washington, DC: United States Printing Office, 1985.
- Modern Dairy Products* by L.M. Lampert. New York: Chemical Publishing, 1975.
- Pricing of Milk and Dairy Products* by M.C. Hallberg. University Park, PA: Department of Agriculture Economics and Rural Sociology, Agricultural Experiment Station, Pennsylvania State University, 1980.
- A Study of Fluid Milk Prices* by John MacIntyre Cassels. Salem, NH: Ayer, 1976.

#### **Bulletins and Pamphlets**

The following are available from the National Dairy Council.

##### *Dairy Council Digest*

*How Americans Use Their Dairy Foods*

*Newer Knowledge of Milk and Other Fluid Dairy Products*. 1983.

The following are available from the United States Government Printing Office.

*Cheese Varieties and Descriptions*. Agricultural Handbook 54. 1978.

*Dairy Products Annual*. A 92 10/5 986.

*Judging and Scoring Milk*. Farmers Bulletin 2111. 1968.

The following are available from the Wisconsin Agriculture Statistics Service.

*Wisconsin Agricultural Statistics*. Annual.

*Wisconsin Dairy Facts*. Annual.

The following is available from the Wisconsin Department of Agriculture, Trade and Consumer Protection.

*A World of Wisconsin Cheese*

#### Periodicals

*Dairy Herd Management*

*Dairymen's Digest*

*Doane's Agricultural Report*

*Farmers' Digest*

*Hoard's Dairyman*

*Successful Farming*

*Wisconsin Agriculturist*

#### Computer Software

The following is available from Hobar Publications.

*Milk and Milk Quality and Related Review*. Apple, IBM, TRS, Macintosh.

#### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Dairy Waste Management Alternatives*. HS87.

*Milk Handling and Cooling*. HS86.

*Milking Systems and Equipment*. HS85.

#### Laboratory Resources

The following is available from the Milk Industry Foundation.

*Manual for Milk Plant Operators*. 1967.



## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Cheesemaking. From the Feel of the Curd to the Tang of the Tongue.* 02000 (16mm film, color, 16 minutes). University of Wisconsin, Photo Media, 1978.

*Dairy Products—From Moo to You.* 00673 (16mm film, color, 14 minutes). Centron, 1975.

*Milk: From Farm to You.* 3rd ed. 06614 (16mm film, color, 13 minutes). Encyclopaedia Britannica Education Corporation, 1973.

*Wisconsin Cheese for All Seasons.* 03807 (16mm film, color, 25 minutes) or 11609 (VHS videotape, color, 25 minutes). University of Wisconsin, Department of Agricultural Journalism, 1980.

The following is available from Modern Talking Picture Service, Inc.

*Dairy Sales on the Farm.* (16mm film, seven minutes)

The following is available from Nasco.

*Cheese Making.* C10777N (90-frame filmstrip with cassette and guide)

## Equipment and Facilities

Butterfat testing kit

Various dairy product handling equipment

Butter churn or jars

Cheese making kit

Ice cream maker

Yogurt maker

## Dairy Science (15-90 days)

This unit deals with the dairy science industry. Topics include career opportunities, dairy cattle selection and genetics, feeding and breeding, marketing of dairy products, and dairy management practices.

### *Objectives*

- To acquaint students with employment information and career opportunities in the dairy science industry
- To develop student appreciation of the variety and nutritional value of dairy products
- To give students opportunities to examine ways to effectively promote dairy products
- To provide students with guidelines for choosing an appropriate breed of dairy cattle for a given farm operation
- To develop student understanding of approved calf management practices for a dairy herd
- To increase student understanding of effective reproductive management practices for a dairy herd
- To provide students with a basis for making effective management decisions based on genetics concerning cattle selection, culling, and sire selection
- To develop student understanding of reproduction and digestion in dairy cattle
- To inform students of how to prevent, diagnose, and treat herd health problems
- To provide students with information on how to design feed rations and feed the entire dairy herd according to their maintenance and production needs
- To develop student understanding of the equipment, housing, land, and labor investment required for a dairy enterprise
- To enhance student understanding of how to produce high-quality milk efficiently and consistently
- To acquaint students with techniques used to process raw milk into dairy products
- To introduce students to methods of marketing milk and milk products
- To introduce students to the latest technology for dairy enterprise operations and management
- To enhance student ability to locate information about youth organizations, breed associations, media outlets, and higher education that will assist them in pursuing a dairy industry career

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to employment in the dairy industry—and relate it to their personal needs and aspirations;
- appreciate the variety and nutritional value of dairy products and effectively promote them;
- distinguish between various dairy breeds and identify their genetic origin, characteristics, and locations of breed headquarters;
- recall the parts of the official dairy scorecard and evaluate cattle accordingly;
- design a calf-raising system, including feeding schedules, environmental control, and manure management;
- design a herd reproductive management program for a dairy herd, complete with a heat-detection procedure, records, and breeding schedule;
- identify parts and describe the function of the male and female reproductive tracts in dairy cattle;

- demonstrate an understanding of reproduction in dairy cattle ;
- demonstrate an understanding of the digestion process in ruminants;
- prevent, diagnose, and treat herd health problems;
- design feed rations and feed for an entire dairy herd according to maintenance and production needs;
- list the equipment, housing, land, and labor investment required for a dairy enterprise;
- distinguish between milk grades, marketing orders, and price blends;
- explain how raw milk is processed into dairy products;
- design a recordkeeping system for production, identification, breeding, accounting, and management for a dairy enterprise;
- evaluate and incorporate new technology and techniques into dairy enterprise operation and management; and
- identify the youth organizations, dairy breed associations, media, and institutions that offer additional education and learning activities related to the dairy industry.

*Subject Matter* (Basic skills integration areas are shown in brackets following title )

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Importance of milk and dairy products [Careers, Science]
  - Milk components
  - Milk and dairy product consumption and trends
  - Promotion of dairy products
    - Local
    - State
    - National programs
- Ideal dairy enterprise
  - Students compare a local farm or one they are familiar with to their perception of an "ideal" operation
  - Discuss experiences with success and failure on the dairy farm
  - Reasons for adopting a particular type of dairy farm management
  - Explain correct or approved practices briefly and how they can be implemented
  - Discuss efficiency, productivity, and profitability
  - Essentials of a profitable dairy operation
- Breeds of dairy cattle
  - Origin and history
  - Breed characteristics, production, and organization headquarters
    - Ayrshire
    - Brown Swiss
    - Guernsey
    - Holstein

Milking Shorthorn  
Jersey

- Dairy cattle evaluation
  - Parts of the dairy cow and functional evaluation of each part
  - Breed associations identifying qualifications and disqualifications in registering purebred cattle
  - Parts on the dairy cow official scorecard
  - Identifying dairy terms for general appearance, dairy character, body capacity, and mammary system
  - Correlation between type and production
  - Methods of evaluating type
    - Breed classification programs
    - Competing in the show ring
    - Learning type appraisal
  - Dairy evaluation contest
  - Linear classification
- Selecting dairy cattle
  - Selection of foundation stock
  - Sire evaluation and selection
    - Natural mating
    - Artificial insemination studs
    - Reading proofs
  - Natural versus artificial insemination
- Breeding heifers and dairy cows
  - Optimum age, weight to breed, and feeding schedules to reach correct levels
  - Detecting heat
  - Natural versus artificial insemination
  - Gestation period and determining calving date
- Reproduction in dairy cattle [Science]
  - Reproductive physiology of the female
    - Anatomy of the reproductive tract
    - The estrus cycle
  - Reproductive physiology of the male
    - Anatomy of the reproductive tract
    - Semen production
  - Abnormalities that cause decreased fertility or sterility
    - Structural defects
    - Physiological abnormalities
  - Diseases that affect reproduction
    - Brucellosis
    - Vibriosis
    - Trichomoniasis
    - Leptospirosis
    - Nonspecific infections
  - Nutrition and reproduction
  - Inheritance

- Managing dairy cattle for high fertility
- Management of reproduction in the male
  - Affect of feed on reproductive performance
  - Rate of usage
  - Housing for bulls
- Summary of procedures for improving breeding efficiency and setting reproductive performance goals
- Artificial insemination and sire selection [Science]
  - History of artificial insemination
  - Collecting and processing semen
    - Frequency of collection
    - Evaluation of semen
    - Semen diluters
  - Frozen semen
  - Inseminating the cow
  - Artificial insemination organizations
  - Artificial insemination records
  - Inbreeding and outbreeding
  - Advantages of artificial insemination
  - Principles of selection
- Raising dairy herd replacements [Science]
  - Care of dairy cow or heifer
    - Feeding
    - Calving conditions
  - Care of the cow and calf at calving
    - Calving assistance, abnormal calving positions
    - Cow care after calving, milking, diseases
    - Feeding the calf
      1. colostrum's contents and benefits
      2. milk replacers
        - contents
        - quality and price considerations
      3. calf starters and feeding schedules up to breeding age for heifers
  - Calf health
    - Vaccination program for infectious bovine rhino tracheitis, para influenza, bovine virus diarrhea, leptisporosis, and brucellosis
    - Diseases
      - pneumonia
      - calf scours
      - parasites
  - Calf management practices
    - Housing types and needs of calves and heifers
    - Dehorning
      1. types
      2. equipment
      3. advantages and disadvantages of each type

- Castration
- Test inspection
- Trimming hooves
  1. methods
  2. equipment
  3. advantages and disadvantages of each method
- Feeding dairy cattle [Science]
  - Nutritive content of common dairy cattle feeds
  - Digestive system of dairy cattle
  - Nutritive requirements
  - Dairy rations for different breeds and age groups
  - The use of forage, silage, and pasture
  - The use of protein supplements
  - Formulating and balancing rations (Pearson Square) using a computer program
- Milking systems and equipment
  - Section
    - Types of milking machines
    - Types of milking systems
  - Equipment common to all milking systems
    - Function, management, and maintenance of the following:
      1. milkline
      2. vacuum lines and pump
      3. claw
      4. inflations
      5. bulk tanks
      6. water source
    - Cleaning of equipment
- Milk secretion
  - Udder components
  - Structure of udder
  - Milk secretion and how milk is produced
  - Proper milking procedure
    - Washing
      1. towel use
      2. iodine or udder wash uses
    - Benefits of strip cups
    - Attaching machine
    - Machine stripping
    - Teat treatment
  - Milk "letdown" mechanism
    - Procedure
    - Hormones
    - Rapid versus slow letdown



- Producing high-quality milk
  - Conditions under which milk is to be produced
  - Milk grades, type, pay prices, and product use
  - Clipping cows
- Production Records [Mathematics]
  - Types of milk tests
    - Babcock, Schain, Dairy Product Section
    - Butterfat, protein, California mastitis test
    - Cryoscope, somatic cell count, bacteria, solids not fat
  - Use of dairy management records
    - Dairy Herd Improvement Association
      1. organizations
      2. benefits and purposes
    - Other programs available
      1. herd management options (HMO)
      2. somatic cell count (SCC)
      3. herd health and all other current reports
- Diseases and parasites of dairy cattle [Science]
  - Diseases and ailments
  - Poisonous chemicals and plants
  - Disease prevention and treatment
  - External and internal parasites
  - Normal temperature and breathing rate of cattle
  - Equipment needed for treatment
- Dairy cattle housing
  - Housing requirement regulations
  - Selecting the type and size of dairy housing
  - Selecting the proper silo and arrangement of dairy buildings and equipment
  - Health and comfort of animals
  - Milking facilities
  - Milk house
  - Storage of feed and bedding
- Marketing dairy cattle, milk, and dairy products [Social Studies]
  - Marketing grade and purebred dairy cattle
    - Replacement heifers
    - Springing heifers
    - Milking cows
    - Cull cows
  - Federal orders
  - Classes of fluid milk
  - Blend price
  - Selecting a milk market
    - Price
    - Quality programs, services, and so on

- Processing milk [Mathematics]
  - Calibrate ingredients and make cheese
  - Calibrate ingredients and make butter
  - Calibrate ingredients and make ice cream
  - Calibrate ingredients and make yogurt
- Dairy enterprise management [Social Studies]
  - Records for all phases of enterprise
  - Methods for keeping current
    - Publications and extension services
    - Educational institutions
    - Breed associations
  - Plan a dairy enterprise (See "Motivational Activities" section.)

### *Motivational Activities*

- Devise a complete plan for a dairy enterprise taking into account all topics discussed in class, such as location, breed of cows, size of herd, feeding program, management decisions, and manure handling.
- Field trips to local dairy enterprises with outstanding dairy herds, dairy shows, and agribusinesses associated with the dairy industry.
- Post bulletin board displays featuring topics related to this unit.
- Provide up-to-date instructional media on dairy production.
- View films, videotapes, and slides on unit-related topics.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Take part in dairy cattle evaluation activities.
- Dehorn calves, treat animals for lice, clip cow's udder and flanks, and dip a calf's navel in iodine.
- Fit animals for dairy shows.
- Exhibit animals at dairy shows.
- Perform a methylene blue test, several mastitis tests, and several butterfat tests.
- Balance rations using a computer.
- Keep dairy records on a computer.
- Make various dairy products, such as cheese, butter, yogurt, and ice cream.

### *Instructional Materials*

#### **Textbooks and Reference**

- Approved Practices in Dairying* by E.M. Juergenson and W.P. Mortenson. 4th ed. Danville, IL: Interstate, 1980. Available from National Farm Book Company.
- Cattle Feeding* by John Owen. Alexandria Bay, NY: Diamond Enterprises, 1983.
- Dairy Cattle Science* by M.E. Ensminger. Danville, IL: Interstate, 1980. Available from National Farm Book Company.
- Dairy Farm Management* by Thomas Quinn. Albany, NY: Delmar, 1980.
- Dairy Production* by Clarence E. Bundy and Ronald V. Diggins. Englewood Cliffs, NJ: Prentice Hall, 1984.

- Feeds and Feeding* by Frank B. Morrison. Abridged. Clinton, IA: Morrison Publishing, 1959.
- Livestock and Poultry Production* by Clarence E. Bundy and Ronald V. Diggins. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1982.
- Modern Dairy Products* by L.M. Lampert. 3rd ed. New York: Chemical Publishing, 1975. Available from National Farm Book Company.
- The Principle of Dairy Farming* by Kenneth Russell. 10th ed. Alexandria Bay, NY: Diamond Enterprises, 1985.
- Principles of Dairy Science* by Glen H. Schmidt and L.D. Van Vleck. San Francisco, CA: W.H. Freeman, 1974.
- A Veterinary Book for Dairy Farmers* by Roger Blowey. Alexandria Bay, NY: Diamond Enterprises, 1985.

#### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Calf Management and Facilities on Selected Wisconsin Dairy Farms.* MA3141.
- Calf Scours—How to Diagnose, Treat and Prevent.* A0442.
- Design Considerations: Least Cost Dairy Ration Computer Program.* R3140. Supplement. R3140-1.
- Managing the Financial Future of Your Dairy Farm.* (Set 1-7). NCR225.
- Raising Dairy Replacements.* A1485.
- The Story of Artificial Insemination Research.* R3266.

The following are available from *Hoard's Dairyman* magazine.

- Dairy Calf Management*
- Dairy Cattle Fertility and Sterility*

The following is available from Ralston Purina Company.

- Animal Nutrition Handbook*

#### Periodicals

- Agri-View*
- Brown Swiss Bulletin*
- Cooperative Partners*
- The Country Today*
- Dairy: The Magazine for the Dairy Herd Improvement Association*
- Dairy Herd Management*
- Dairymen's Digest—North Central Region Edition*
- Farm Journal*
- Hoard's Dairyman*
- Holstein World* (formerly *Holstein-Friesian World*)
- Journal of the Milking Shorthorn and Illawarra Breeds* (formerly *Milking Shorthorn Journal*)
- Successful Farming*
- Wisconsin Agriculturalist*

## Computer Software

The following is available from Hobar Publications.

*Dairy Production and Related Review.* Apple, IBM.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Dairy Ration Master*

*Micro-Tutor: Dairy Production.* Apple, IBM.

*Micro-Tutor: Feeds and Feeding.* Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Dairy Cow.* Apple.

*Agri-Quiz: Dairy I.* Apple, IBM.

*Agri-Quiz: Dairy II.* Apple, IBM.

The following are available from Photocom.

*Ag Vocabulary—Dairy*

*Cow Card*

*Dairy Management*

The following is available from Sage Software.

*Dairy Ration Balancing.* IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Dairy Calf Health Program.* HS703.

*Dairy Cow Health Program.* HS702.

*Dairy Housing Costs.* HS81.

*Dairy Housing Systems.* HS80.

*Finding Dairy Markets.* HS222.

*Finding Markets for Dairy Cattle.* HS431.

*Livestock or Dairy Selection.* HS128.

*Milking Systems and Equipment.* HS85.

## Films, Videotapes, and Slides

The following is available from Babson Brothers Dairy Research Service.

*Making Your Cows Worth More.* (16mm film, color, 30 minutes.) 1977.

The following is available from Ohio Agricultural Education Curriculum Materials Service.

*Pre-natal Development of the Calf.* 418X (50-frame color filmstrip with script). Vocational Education Productions, n.d.

The following are available from Photocom.

*Animal Acquisition and Reproduction.* 30-678 (VHS videotape, 38 minutes).

*Clipping Dairy Cattle.* 01-000-100C (VHS videotape, 17 minutes).

*Lactation.* 30-679 (VHS videotape, 39 minutes).

*Waste Management, Buildings and Equipment.* 30-682 (VHS videotape, 36 minutes).

The following is available from the Media Resources Center.

*Rumen Story* (16mm film, color, 25 minutes.)

The following is available from Vocational Agriculture Services.

*The Cow's Udder and How It Functions.* F208a (Filmstrip with cassette and study guide).

The following is available from Vocational Education Productions.

*Guide to Linear.* 1-411-200H (46-frame slideset with cassette).

The following is available from Vocational Media Associates.

*Dairy Production.* 30799-93 (Three parts, filmstrips or slides with cassettes, program guides, and reproducible masters).

## Electricity, Agricultural Power (30-45 days)

This unit deals with electrical power as related to agriculture. Topics include career opportunities, electrical principles and terms, circuits and conductors, wiring, lighting, motors, three-phase power, electrical application, and safety measures.

### *Objectives*

- To acquaint students with employment information and career opportunities in the agricultural power industry
- To increase student understanding of electrical terminology and principles
- To demonstrate to students simple wiring and circuit layouts using tools, fixtures, and other equipment.
- To develop student understanding of power generation, transmission, and application
- To discuss with students safety measures when using or working with electricity

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural power industry—and relate it to their personal needs and aspirations;
- employ electrical principles and terminology in laboratory exercises;
- apply fundamental skills, procedures, and circuitry involved in electrical wiring;
- explain electrical safety measures and codes;
- apply electrical maintenance and simple wiring operations;
- identify electric motors, controls, and applications; and
- disconnect power before working on electrical circuits.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Electrical power significance [Mathematics, Social Studies]
  - Magnitude
  - Impact
  - Conservation
  - Electric usage calculations

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- Principles of electricity [Science]
  - Conventional theory
  - Electron theory
  - Circuits
- Electrical terminology [Mathematics, Science]
  - Electrical terms
  - Ohms law and Watts law
  - Energy measurement
- Electrical safety
  - Underwriters' Laboratories (UL) label
  - Cords
  - Proper fuses, breakers, weather-proofing devices
  - Service safety
  - Grounding procedures
  - Ground Fault Circuit Interrupter (GFCI)
  - Stray voltage
- Generation, transmission, and sale of electrical power [Science]
  - Area generating plants
  - Types of generating plants
  - Transformers and transmission lines
  - Substations and distribution
- On-farm electrical distribution
  - Distribution lines and pole location
  - Farm transformers
  - Service drops
- Planning building circuitry
  - Demand
  - Code requirements
  - Design
- Conductors
  - Wire sizes
  - Wire capacities
  - Insulation types
- Identification and maintenance of boxes, switches, receptacles, fixtures, cords, and connectors
- Electrical installation tools and test equipment
  - Tool identification
  - Test lights and meters
- Wiring installation procedures
  - Nonmetallic cable
  - Armored cable wires

- Conduit wires
- Sheathed cable
- Cutting, splicing, and connecting wires
- Lighting systems
  - Equipment operation
  - Layout and selection
- Electric motors [Mathematics, Science]
  - Principals of operation
  - Motor types
  - Fractional horse power motors
  - Large electric motors
- Motor applications [Mathematics, Science]
  - Selection
  - Protection
  - Drives
  - Motor maintenance
- Automatic controls [Science]
  - Switches and switch control circuits
  - Relay devices
  - Motor control devices
  - Automatic sensing devices
- Three-phase power [Mathematics, Science]
  - Obstacles in obtaining service
  - Advantages
  - Phase converters
    - Static converter
    - Rotary transformer
- Agricultural applications of electricity [Mathematics, Science]
  - Irrigation systems
  - Grain drying
  - Heat lamps
  - Heat cables
  - Water heating
  - Electric fences
  - Ventilation
  - Humidifiers
  - Dehumidifiers
  - Lighting systems
- Emergency generation of power
  - Tractor power take-off (PTO) driven units
    - Alternators
    - Generators



- Self contained engine-driven units (gasoline or diesel)
- Electric current only
- Combination generator/welder units

### *Motivational Activities*

- Take a field trip to local electric power plant.
- Invite an electrician to give a class presentation.
- Make use of identification display panels.
- Post bulletin board displays featuring topics related to this unit.
- View films, videotapes, and slides of unit topics.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Conduct an electrical use survey in the home or school.
- Do simple wiring in a model house skeleton.
- Participate in a safety inspection program.
- Dismantle simple motors and reassemble.
- Identify and calculate resistance of resistors, diodes, and capacitors.

### *Instructional Materials*

#### **Textbooks and References**

- Agricultural Wiring Handbook*. 7th ed. Columbia, MO: National Food and Energy Council, n.d.
- Electricity and Basic Electronics* by Stephen R. Matt. South Holland, IL: Goodheart-Willcox, 1982.
- Exploring Electricity and Electronics* by H. Gerrish and W. Dugger, Jr. rev. ed. South Holland, IL: Goodheart-Willcox, 1981.
- Fundamentals of Electricity. Basics of Electricity, Electronics, Controls and Computers* by R.G. Seippel. 6th ed. Homewood, IL: American Technical Publishing, 1974.
- Fundamentals of Electricity for Agriculture* by Robert J. Gustafson. New York: AVI Publishing, 1980.
- Practical Electrical Wiring* by H.P. Richter. 14th ed. New York: McGraw-Hill, 1987.
- Using Electricity* by J. Ronald Hamilton. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1971.
- Wiring Simplified. Based on 1987 Code* by H.P. Richter. 35th ed. St. Paul, MN: Park Publishing, 1986.

#### **Bulletins and Pamphlets**

The following are available from the American Association for Vocational Instruction Materials.

- Electrical Energy*. 304.
- Electrical Wiring*. Teacher Guide, 305TG. Student Workbook, 305SW.
- Electric Motors*. 302.
- How Electric Motors Start and Run*. 300.
- Understanding Electricity and Electrical Terms*. 303.

The following are available from the Cooperative Extension Service:

- Farm Lighting*. AF2243
- How to Use Electric Energy More Efficiently on the Farm*. A2579
- Reducing Home Lighting Expenses*. E3100
- Standby Electric Power Equipment for the Farm and Home*. A2273
- Stray Voltage Problems with Dairy Cows*. NCR125
- Wisconsin Farm Safety Inspection Report*. A2374

The following are available from Hobar Publications:

- Agricultural Wiring Handbook*. 574
- Basic Electricity and Practical Wiring*. 2377
- Electrical and Basic Controls Used in Agriculture Production*. 2277

The following are available from the Instructional Materials Service:

- Electric Motors—Lesson Plans for Agricultural Production*. 4555
- Controls and Control Circuits*. 4549
- Wiring and Safety*. 4548

The following is available from the Ohio Agricultural Education Curriculum Materials Service:

- Demonstrations and Related Information for Teaching Electricity and Electrical Wiring*. 720G

The following are available from Vocational Agriculture Services:

- Electrical Hazards in Home, Farm and Business*. U3012a
- Electrical Wiring Procedures*. U3016a
- Planning for Electrical Wiring*. U3003b
- Using Three-Phase Electrical Power on the Farm*. U3038

#### Periodicals

- Computers and Electronics in Agriculture*
- Power Engineering*
- RE Magazine* (formerly *Rural Electrification Magazine*)

#### Computer Software

The following are available from Hobar Publications:

- Basic Electronics and Related Review*. Apple, IBM, TRS, Macintosh
- Electric Motor Review*. Apple, IBM, TRS, Macintosh
- Electric Principles and Wiring Review*. Apple, IBM, TRS, Macintosh
- Electrical Systems and Related Review*. Apple, IBM, TRS, Macintosh
- Ohm's Law: Series and Parallel Circuits*. Apple
- Practicing Ohm's Law, Power Law, and Resistor Circuits*. Apple

## Laboratory Resources

The following is available from Interstate Printers and Publishers, Inc.

*Basic Electronic Identification Kit*

## Films, Videotapes, and Slides

The following is available from the American Association for Vocational Instruction Materials

*Understanding Electricity and Electrical Terms*. S303 (Slides) or AV303-2F (Filmstrip). 1986.

The following are available from the Bureau of Audio Visual Instruction

*Electric Circuits*. 11324 (VHS videotape, color, 30 minutes). Annenberg/CPB Project, 1986.

*Electricity: The Way It Works*. 00478 (16mm film, color, 16 minutes). Electric Letter, 1975.

*Our Invisible Friend: Electricity*. 11720 (VHS videotape, color, 17 minutes). Film Communicators, 1985.

*Studying Electricity*. 04857 (16mm film, color, 16 minutes). Journal Films, 1987.

The following is available from the Media Resources Center

*The R.E.A. Story*. S58405F (16mm film, color, 28 minutes). United States Department of Agriculture, 1960.

The following are available from Vocational Agriculture Services

*Cleaning Electric Motors*. 416 (46-frame filmstrip).

*Electric Motors 1 - Magnetism and DC Motor*. F412a (34-frame filmstrip).

*Electric Motors 2 - Induction and AC Motor*. F413a (36-frame filmstrip).

*Electric Motors 3 - Test, Connect, Reverse*. 414a (39-frame filmstrip).

*Electric Motors 4 - Trouble Shooting*. F415a (64-frame filmstrip).

*Identification of Electric Wiring Items*. F404c (66-frame filmstrip).

## Energy Alternatives (10-20 days)

This unit deals with alternative agricultural energy sources. Topics include career opportunities, solar energy, wind power, plant source fuel, waste material fuel, and heat exchangers.

### Objectives

- To acquaint students with employment information and career opportunities in the field of alternative energies
- To develop student understanding of solar energy collection, equipment components, and storage
- To create student awareness and understanding of wind power technology
- To explain to students the technology, harvesting, and uses of fuels from plant sources
- To develop student understanding of the potential, technology, and the positive environmental impact of bioconversion fuel
- To introduce students to information and a working understanding of heat exchangers
- To provide students with information and a working understanding of solar collectors.

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the alternative energy source industry—and relate it to their personal needs and aspirations;
- describe alternate energy sources useful to agriculture;
- choose the most economical alternative energy source to satisfy demand;
- examine each new energy source for potential safety and environmental impact;
- understand solar collector construction and adjustment;
- compare active and passive solar heating systems;
- identify wind power uses, developmental problems, and windmill efficiency;
- understand how fuels can be generated from plant materials;
- explain the process of fuel production from animal waste material;
- distinguish the advantages of manure utilization;
- identify major energy consuming agricultural operations, and
- calculate and compare cost efficiencies of heat exchangers and other alternative energies.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

● **Solar Energy [Mathematics, Science]**

— Solar collectors

Flat-plate type

1. air collector
2. cover plate collector
3. cover, suspended plate

Concentrating type

1. tubed water collector
2. tubeless water collector
3. maintenance

— Solar air heaters for livestock housing

— Collector efficiency

Definition

Comparisons

— Solar collector composition

Cover material

1. glass
2. plastic film or sheets
3. greenhouse grade fiberglass

Absorber plates

1. color
2. materials used

Casing construction

1. materials used
2. adjustments

— Solar energy availability factors

Climate

Time element

Geographic location

Solar hours for Wisconsin

— Solar energy storage

Sensible heat

1. water tanks
2. rock beds

Heat of fusion

— Solar heating designs

Heating load

Insulation

Heat storage requirements

● **Wind Power [Mathematics, Science]**

— History

Persia - 7th century

United States farms and homesteads - 1920

Rural Electrification Administration (REA) - May 1935

— Resources

Solar convections and conversions

Future wind power trends

- Technology
    - Kinetic energy conversion
    - Efficiency
    - Power output
    - Elevation relevancy
  - Deterants
    - Variable nature of wind
    - Production capacity
    - Current generation frequency
    - Storage
    - Availability
  - Environmental concerns
- Fuels from plants [Mathematics, Science]
    - Vegetative chemical energy
      - Energy content uniformity
      - Energy capacity
    - Resources
      - Wood
      - Grains
      - Crops and crop residues
    - Technology
      - Cost efficiency
      - Hybrid plants
    - Energy farms
      - Algae
      - Water hyacinth
      - Trees
      - Agricultural crops and residue use
    - Problems
      - Land use
      - Photosynthetic efficiency
  - Bioconversion fuels from waste [Mathematics, Science]
    - Organic
      - Biomass production
      - Energy potential and conversions
      - Agricultural sources
        1. manure
        2. wood products
        3. agriculture crops and food wastes
    - Waste fuel benefits
      - Commercial benefit
      - Soil improvement
      - Cost efficiency
    - Conversions
      - Thermal systems
        1. shred and burn process
        2. anaerobic heating

#### Biological systems

1. anaerobic digestion
2. other fermentations

#### — Considerations

Solid waste disposal credit  
Soil needs  
Energy needs

#### ● Heat exchangers [Mathematics]

##### — Purpose

##### — Types

Water heaters

Air heaters

##### — Costs

Exchanger comparisons

Long-run benefits

Decreased water heating costs

Exchanger capacities

### *Motivational Activities*

- Post a bulletin board display.
- View films, slides, and videotapes on unit topics
- Take a field trip to energy conserving industry or business.
- Invite resource people to give class presentations.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Conduct an energy awareness program for elementary students similar to the Food for America program.
- Sponsor an energy conservation poster contest for elementary students.
- Demonstrate how to construct a compost pile for home gardeners.
- Prepare an exhibit on the insulation of dairy barns.
- Practice minimum tillage on school or farm plots.
- Recondition windmills to pump water for livestock.
- Construct a gasohol exhibit.
- Prepare and present radio and TV programs on the use and conservation of energy.
- Write an article on energy conservation and publish it in the local and school newspaper.
- Prepare and deliver an FFA speech on energy.
- Conduct an "energy watch" on home fuel and electric bills, and formulate a plan to reduce energy costs.
- Demonstrate how to weatherstrip and caulk doors and windows.

### *Instructional Materials*

#### **Textbooks and References**

*Energy Alternatives: A Comparative Analysis of Organic Farms.* Norman, OK: University of Oklahoma, 1975.

*Energy Use and Management in Agriculture* by B.A. Stout. Belmont, CA: Brenton, 1984.  
*The Food and Heat Producing Solar Greenhouse* by Rick Fisher and Bill Yanda. Sante Fe, NM: John Muir Publications, 1976.  
*Fuel From Farms: A Guide to Small-Scale Ethanol Production*. Oak Ridge, TN: United States Department of Energy Technical Information Center, 1980.  
*Gardner's Solar Greenhouse* by Ray Wolf. Emmaus, PA: Rodale Press, 1984.  
*Handbook of Homemade Power*. New York: Bantam Books, 1974.  
*Solar Energy—Fundamentals in Building Design* by Bruce Anderson. New York: McGraw-Hill, 1977.  
*United States Energy Atlas* by David J. Cuff and William J. Young. 2nd ed. New York: Macmillan, 1986.

### **Bulletins and Pamphlets**

The following is available from the American Forest Institute.

#### *Green America*

The following are available from the American Petroleum Institute.

#### *Energy and Our Lands*

*The Language of Energy: A Glossary of Words and Phrases Used in the Energy Industry*. 877-71600.

The following is available from the Bureau of Reclamation.

#### *Hydropower: Water at Work*

The following are available from the Cooperative Extension Service.

*Energy from the Wind*. A3199.

*Facts on Power Alcohol*. A3074.

*Heat Exchangers for Livestock Housing*. A3312.

*Heating Water with a Milk Cooler Exchanger*. A2993.

*How to Figure Heat Loss and Fuel Costs*. A1844.

*How to Use Electric Energy more Efficiently on the Farm*. A2579.

*Methane Gas from Swine Manure*. PIH76.

*Solar Heating for Milking Parlors*. AF2266.

*Use Solar Energy to Ventilate Livestock Buildings and Dry Grain*. A3094.

The following is available from the National Science Teachers Association.

#### *Energy Sources Fact Sheet*

The following is available from the New Alchemy Institute.

#### *Methane Digesters for Fuel Gas and Fertilizer*



The following are available from the Northern States Power Company.

*Alternative Energy Sources and Technologies*  
*HydroPower: Energy Made in Wisconsin*

The following is available from Purdue University Cooperative Extension Service.

*Solar Heating for Home, Farm, and Small Business*

The following are available from the Research Products Corporation.

*Solar Energy Facts.* 6009.  
*Solar Heating Systems.* 6001.

The following is available from the United States Government Printing Office.

*Tips for Energy Savers.* 85-8320.

The following is available from the Wisconsin Power and Light Company.

*Guide to Farm Energy Management*

#### **Periodicals**

*Alternative Sources of Energy Magazine*  
*Mother Earth News*  
*Solar Utilization News*  
*Wind Technology Journal*  
*Windpower Digest*

#### **Computer Software**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Dairy Waste Management Alternatives.* HS87.  
*Tillage and Conservation.* HS172.  
*Waste Management Alternatives.* HS71.

#### **Laboratory Resources**

The following are available from Northern States Power Company.

*Alternate Energy Sources . . . Experiments You Can Do . . . from Edison*  
*Environmental Experiments . . . from Edison*

#### **Films, Videotapes, and Slides**

The following are available from the Bureau of Audio Visual Instruction.

*Backyard Alternative Energy.* 03751 (16mm film, color, 26 minutes). Brumfield Kirby, 1978.

*Bill Loosely's Heat Pump*. 04472 (16mm, film, color, 10 minutes). Bullfrog, 1975.  
*Energy: A Light at the End of the Tunnel*. 10305 (16mm film, color, 31 minutes). Coronet, 1981.  
*Energy in Perspective*. 02218 (16mm film, color, 21 minutes). BP North America, 1976.  
*Energy: New Sources*. 08241 (16mm film, color, 20 minutes). Churchill, 1974.  
*Energy Saving on the Farm*. 06481 (16mm film, color, 27 minutes). University of Wisconsin, Department of Agricultural Journalism, 1981.  
*Energy: The Alternatives*. 11736 (16mm film, color, 12 minutes). Media Guild, 1977.  
*Sun Power for Farms*. 01769 (16mm film, color, 12 minutes). National Audio Visual Center, 1977.

The following is available from Chevron, U.S.A.

*The Energy Picture*. 18184 (VHS videotape, color, 27 minutes). 1982.

The following is available from the Exxon Corporation.

*Energy for the 80's*. 16216 (16mm film or  $\frac{3}{4}$ -inch, V-matic videotape; color; 27 minutes).

The following are available from the Media Resources Center.

*Energy: Less Is More*. S40173F (16mm film, color, 18 minutes). Churchill Films, 1974.  
*Energy: The Dilemma*. S40172F (16mm film, color, 20 minutes). Churchill Films, 1974.

The following are available from Los Alamos National Laboratory.

*Geothermal Energy from Hot, Dry Rocks*. Y-286 (VHS videotape, color, 15 minutes). 1978.  
*One with the Earth: Energy from Hot, Dry Rock*. Y-320 (16mm film, color, 22 minutes). 1981.

The following are available from Modern Talking Picture Service, Inc.

*Farm Energy: A Profitable Crop*. (16mm film, color, six minutes).  
*Farmers Generate More Energy Ideas*. (16mm film, color, six minutes).

The following are available from the Northern States Power Company.

*Energy: Electric Power from the Sea*. (16mm film, color, 30 minutes.) Volume 13, Issue 4. Science Screen Films, 1984.  
*Energy Where You Least Expect It*. (16mm film, color, 28 minutes.) Journal Films, 1982.  
*Engineering: To Capture the Sun*. (16mm film, color, 30 minutes.) Volume 16, Issue 5. Science Screen Films, 1987.  
*Harnessing the Sun*. (Filmstrip, 14 minutes.) Geographic Society, 1977.  
*Solar Heating*. (16mm film, color, 17 minutes.) Electric Power Research Institute, 1981.  
*Water Power*. (16mm film, color, 25 minutes.) Neal Livingston, 1981.

The following is available from Sandia National Laboratories.

*New Mexico Passive Solar Buildings*. 533 (16mm film, color, 13 minutes). 1978.

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## Energy Conservation (20-30 days)

This unit deals with energy conservation. Topics include career opportunities, energy forms, terminology, insulation values, conservation tillage, and energy conservation plans.

### *Objectives*

- To acquaint students with employment information and career opportunities in the energy conservation field
- To provide students with information on available forms of energy
- To familiarize students with energy conservation terms
- To increase student ability to calculate energy consumption costs
- To develop student understanding of energy conservation methods applicable to agriculture
- To increase student comprehension of choosing equipment, insulation, and operational systems with energy conservation features
- To familiarize students with current residential and agricultural energy conservation improvements

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the energy conservation industry—and relate it to their personal needs and aspirations;
- list available forms of energy;
- define terms related to energy conservation;
- perform mathematical problems using energy equations;
- list conservation areas in agriculture that need improvement;
- understand and calculate insulation and R-values;
- select motors and small engines with energy-conserving features;
- choose irrigation systems with energy-conserving features;
- calculate the fuel savings of conservation tillage; and
- develop a plan to improve residential and agriculture energy efficiency.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Energy conservation overview [Mathematics, Science]
  - Definition

- Sources of agricultural energy
  - Fossil fuels
  - Converted energy sources
    1. solar
    2. hydrological
    3. nuclear
    4. bioconversion
- Usable energies and definitions
- Conversion units
- Agricultural energy conservation [Mathematics]
  - Cost/benefit ratios
  - Daily energy usage charts
  - Energy conservation steps
    - Turn lights off
    - Reduce driving
    - Keep equipment and machinery clean
    - Combine agricultural and residential operations
  - Calculate daily energy waste and cost
- Residential energy usage [Mathematics]
  - Energy use checklist
  - Inventory individual rooms regarding conservation practices
    - Kitchen
      1. match pots and pans to stove burner size and cover them
      2. use smaller appliances when appropriate
    - Living rooms and bedrooms
      1. maintain proper air temperatures
      2. turn off lights not in use
    - Bathroom and laundry areas
      1. stop water leaks
      2. use full loads when washing clothes
      3. choose water-conserving toilets
  - Insulation
    - R-factors
    - Window heat loss
    - Attic and basement heat loss
    - Heat circulation
  - Energy-saving practices for agricultural buildings
  - Windbreaks
  - Proper lighting systems and bulb selection
- Production agriculture [Mathematics]
  - Equipment
    - Scheduled tractor tune-ups
    - Regular machinery maintenance and cleaning
  - Conservation tillage
    - Plow depth
    - Combined operations
    - Sharp implements
    - Properly adjusted implements
    - Proper soil conditions
      1. moisture
      2. temperature

- Proper tillage patterns
  1. contour tillage
  2. field analysis
  3. strip cropping
  4. vegetated waterways
- Tractor size selection
- Fertilizer and chemical application
  - Soil testing
  - Law of diminishing returns
  - Fuel consumption
  - Crop residue and manure use
  - Crop rotations
  - Threshold levels
  - Integrated pest management
- Energy-saving practices during harvest
  - Combine operations
  - Sharp knives
  - Equipment adjustments
  - Power take-off (PTO) speeds
  - Tractor idling and adjustments
  - Timing
    1. climatic
    2. moisture content
- Tractor energy efficiency
  - Tire selection
  - Two- or four-wheel drive
  - Horsepower selection
  - PTO efficiency
    1. crop harvests
    2. feed grinding
- Engines, small motors, and irrigation systems **[Mathematics]**
  - Energy-saving features
  - Motor and engine selection
  - Perform engine overhauls
- Energy efficiency and usage **[Mathematics, Science]**
  - United States food system energy consumption
  - Energy-conserving practices
    - Decrease overall use
    - Technological advances with present fuels
    - Technological development of new energy sources
  - Daily energy waste or loss
  - Diesel versus gasoline engines and tractors

### *Motivational Activities*

- Post bulletin board displays featuring topics related to this unit.
- View slides, films, and videotapes on unit topics.
- Invite resource people to give class presentations.
- Take a field trip to an energy plant, businesses and industries implementing energy conservation, and farms using conservation tillage practices.

## *Learning Activities*

- Build models showing erosion and cropping patterns.
- Inventory a residential or agricultural situation and calculate energy losses.
- Demonstrate projects using alternative forms of energy.

## *Instructional Materials*

### **Textbooks and References**

- Approved Practices in Soil Conservation* by Albert B. Foster and Duane Bosworth. 5th ed. Danville, IL: Interstate, 1982. Available from National Farm Book Company.
- Conservation Farming*. Moline, IL: John Deere Company, 1980. Available from National Farm Book Company.
- Environmental Conservation* by Raymond F. Dasmann. 5th ed. New York: John Wiley and Sons, 1984. Available from National Farm Book Company.
- Introduction to Environmental Science* by Michael D. Morgan et al. New York: W. H. Freeman, 1985.
- Investigations in Conservation of Natural Resources* by Harry B. Kircher and Richard A. Lytle. 2nd ed. Danville, IL: Interstate, 1984.
- Managing Our National Resources* by William G. Camp and Thomas B. Daugherty. 5th ed. Albany, NY: Delmar, 1988. Available from National Farm Book Company.
- Our Natural Resources and Their Conservation* by Harry B. Kircher and Donald L. Wallace. 6th ed. Danville, IL: Interstate, 1981. Available from National Farm Book Company.
- Soil and Water Conservation for Productivity and Environment Protection* by Frederick R. Troeh. Englewood, NJ: Prentice Hall, 1980. Available from National Farm Book Company.

### **Bulletins and Pamphlets**

The following are available from American Society of Agricultural Engineers.

- The Biological Liquid Fuel's Alternative: A Special Report*. 1981.
- Energy: Current Supplies and Future Technology*
- Optimizing Energy Options*

The following is available from American Soybean Association.

- Soy as a Diesel Fuel: Economic and Technical*

The following are available from the Cooperative Extension Service.

- Choosing Tires for Better Gas Mileage*. A2943
- Conservation Tillage for Dairy Farmers*. A3370
- First Things First — What to Do Before Investing in Home Insulation*. E2928.
- How to Use Electric Energy More Efficiently on the Farm*. A2579.
- Landscaping for Energy Conservation*. A3066.
- Maintaining an Efficient Irrigation Pumping Plant Can Save You Money and Help Conserve Energy*. A2954.
- Wisconsin's Soil and Water Conservation Program*. G3230.

The following is available from the University of Missouri.

- On Farm Energy Production Engineering*

The following are available from Exxon Company.

*Energy Outlook, 1980-2000.* 1980.  
*World Energy Outlook*

The following are available from Midwest Plan Service.

*Low Temperature and Solar Grain Drying Handbook*  
*Solar Livestock Housing Handbook*

The following are available from National Food and Energy Council.

*Farm Energy Analysis—A Food and Energy Program*  
*Less Regulation...More Energy*  
*Off-Farm Energy Requirements and Projections*  
*The Food—Energy Connection: Conflict or Compromise*  
*Water...Will There Be Enough?*

The following is available from the United States Government Printing Office.

*Alcohol as a Fuel for Farm and Construction Equipment.* 83-13070.

The following are available from Vocational Agriculture Services.

*Collecting and Using Solar Energy.* U3060.  
*Energy Alternatives in Agriculture: Alcohol.* U3054.  
*How Can I Save Money and Energy by Insulating My Home.* U3050.

#### **Periodicals**

*EPRI Journal*  
*Lead*  
*Natural Gas News* (formerly *Natural Gas*)  
*Northern Sun News*  
*Popular Science*

#### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Cost of Farming.* HS174.  
*Integrated Pest Management.* HS629.  
*Reducing Production Costs.* HS175.  
*Tillage and Conservation.* HS172.  
*Waste Management Alternatives.* HS71.

#### **Laboratory Resources**

The following is available from Vocational Agriculture Services.

*Energy Challenges and Choices* is a two-part study guide consisting of the following:

- "Part I: Energy Use and Supply." G411-1.
- "Part II: Home Energy Management." G411-2.

## Films, Videotapes, and Slides

The following is available from the Aluminum Association.

*Energy: The Challenge to Conserve.* (Color filmstrip with cassette and script.) 1983.

The following are available from the Bureau of Audio Visual Instruction.

*Century III: Man and His Environment.* 04812, (16mm film, color, 28 minutes). National Audio Visual Center, 1975.

*Down on the Farm.* 10579 (VHS videotape, color, 57 minutes). Time Life, 1984.

*Earth's Physical Resources.* 11729 (VHS videotape, color, 50 minutes). Media Guild, 1985.

*Energy in Perspective.* 13328 (16mm film, color, 21 minutes). BP North America, 1976.

*Energy: The Alternatives.* 11736 (VHS videotape, color, 24 minutes). Media Guild, 1985.

*Energy Saving on the Farm.* 06481 (16mm film, color, 27 minutes). University of Wisconsin, Department of Agricultural Journalism, 1981.

*Geothermal Energy.* 11741 (VHS videotape, color, 34 minutes). Media Guild, 1984.

*High Energy Efficiency—An Imperative for Tomorrow.* 02149 (16mm film, color, 25 minutes). Monumental, 1977.

*Sun Power for Farms.* 01769 (16mm film, color, 12 minutes). National Audio Visual Center, 1977.

The following is available from Hobar Publications.

*Insulation for Livestock Buildings.* 305 (22 color slides).

The following are available from the Media Resources Center.

*The Energy Challenge. Program 2.* S57885V (¾-inch videotape, color, 30 minutes). University of Nebraska, Audio Visual Instruction, 1980.

*Energy: Less is More.* S40173F (16mm film, color, 18 minutes). Churchill Films, 1974.

The following are available from Modern Talking Picture Service, Inc.

*Farm Energy: A Profitable Crop.* (16mm film, color, six minutes.)

*Farmers Generate More Energy Ideas.* (16mm film, color, six minutes.)

The following is available from the National Food and Energy Council.

*The Delicate Balance.* (Filmstrip.)

The following is available from the Sunstone Corporation.

*Applications of Solar Energy.* (Slides.)

The following is available from Vocational Agriculture Services.

*Energy Challenges and Choices* is a two-part filmstrip set consisting of the following:

"Part I: Energy Use and Supply." F411-1.

"Part II: Home Energy Management." F411-2.



## Environmental Conservation (90 days)

This unit deals with the major concerns affecting our environment. Topics include career opportunities, conservation philosophy, wildlife management, water quality, air pollution, forestry, soil conservation, and energy conservation.

### Objectives

- To acquaint students with employment information and career opportunities in the environmental conservation industry
- To assist students in developing a responsible philosophy dealing with the environment
- To acquaint students with the need for wildlife management as it relates to benefits of society, population trends, habitats, food availability, and control methods
- To illustrate to students the relationship between groundwater quality and waste disposal
- To inform students about the consequences of air pollution and federal regulations
- To increase student understanding of the value of forests and the need for paper management
- To enhance student comprehension of soil formation, the effects of erosion, and approved conservation practices
- To emphasize to students the importance of energy conservation and the methods used to minimize waste products

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the environmental conservation industry—and relate it to their personal needs and aspirations;
- describe environmental factors that benefit or harm local wildlife;
- recognize the importance of plant life as a source of food for all animals;
- list specific food sources and habitats for local wildlife;
- understand rules and regulations for hunting and fishing;
- describe the causes and effects of acid rain in Wisconsin;
- identify the major air contaminants in Wisconsin and the problems associated with each;
- determine sources of air pollution in Wisconsin;
- identify and explain ways of controlling diseases and insects found in Wisconsin;
- determine when insect and disease damage has occurred in trees;
- understand soil origin, texture, color, structure, and its interrelationship with plants;
- take a soil sample and properly prepare it for analysis at a soil lab;
- identify factors that determine soil erosion;
- describe common soil conservation practices and appreciate their value;
- explain the effect of water pollution on fish populations; and
- identify energy hazards and explain how to avoid them.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements

- Working conditions
- Opportunities for advancement
- Other factors
- Conservation philosophy [Science]
  - Conservation versus preservation
  - Increased stress on environment
  - Resource management
  - Renewable resources
  - Nonrenewable resources
- Wildlife management [Science]
  - Benefits to society
  - Values (economic and aesthetic)
  - Food webs and habitat
  - Population trends
  - Inventory control
  - Mammals, furbearers, birds, waterfowl
  - Disease and parasites
- Water quality [Science]
  - Our water supply
  - Dependence on water (modern lifestyle)
  - Water pollutants
  - Hydrologic cycle
  - Industrial and residential water consumption
  - Maintaining groundwater quality
  - Wisconsin is rich in water resources
- Air pollution [Science]
  - Effects on environment
  - Sources of pollution
  - Contaminants
  - Federal standards
  - Prevention methods
- Forestry [Science]
  - Classification and identification
  - Importance of trees
  - Production and management practices
  - Commercial uses of different species
  - Tree planting
  - Forestry programs
  - Forestry skills and techniques
  - Chainsaw safety
  - Disease and insect control
- Soil conservation [Science]
  - Process of soil formation
  - Soil properties
  - Soil survey maps
  - Land use capabilities
  - Fertilizer types and application
  - Soil erosion and its effect on the environment

- Soil conservation practices
- Importance of organic matter
- Energy conservation [Science]
  - Energy facts and figures
  - Energy alternatives
    - Solar
    - Wind
    - Fuels
    - Water
    - Heat exchanges
    - Nuclear
  - Conserving farm energy
  - Energy-savings tips
  - R-values of insulation

### *Motivational Activities*

- Take a field trips to
  - a farm to view erosion- and pollution-control practices;
  - a game farm, fish hatchery, or wildlife preserve;
  - polluted lakes or streams;
  - a sewerage-treatment plant or garbage disposal facility;
  - a lumber yard to see different grades and types of lumber;
  - a pulpwood or water board plant.
- Invite the following resource people to give class presentations:
  - Wisconsin Department of Natural Resources representative
  - Soil Conservation Service representative
  - game manager
  - Agricultural Stabilization and Conservation Service representative
  - Environmental Protection Agency representative
  - county extension forester
- Post bulletin board displays about plant and animal species.
- Prepare a exhibit displaying the natural enemies of plants and animals.
- View videotapes, films, and slides on unit-related topics.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Study the history of Wisconsin deer harvest
- Create posters or charts that describe a food chain.
- Determine how much water is used in your home per day.
- Examine a sample of lake water under a microscope.
- Take a water sample from your home and have it tested at a laboratory.
- Dissolve a piece of limestone with an acid rain solution.
- Examine used filters from an air conditioning unit or a heating duct.
- Collect and display labels that describe air-quality hazards from aerosol spray containers.
- Demonstrate how to plant a tree.
- Demonstrate the safe use of a chain saw.
- Demonstrate how to select and mark trees for cutting.
- Identify tree species in a local forest.
- Develop a hiking trail through the school forest, including signs to identify tree species.
- Take soil samples and send them to a laboratory for analysis; share findings with the class.
- Locate area farms on a soil survey map.
- Demonstrate how to weather-strip and caulk doors and windows.

## *Instructional Materials*

### **Textbooks and References**

- Basic Field Techniques in Wildlife Management.* Columbus, OH: Ohio Agricultural Education Curriculum Materials Service, 1975.
- Conservation Farming* by Harold A. Hughes. Moline, IL: John Deere Company, 1980. Available from Agri-Farm Publications, Inc.
- Environmental Conservation* by Raymond Frederick Dasmann. 5th ed. New York: John Wiley and Sons, 1984. Available from National Farm Book Company.
- Forestry Manual for Vocational Agricultural Instructors* from the Wisconsin Association of Vocational Agricultural Instructors. Bulletin 7001. Madison, WI: Department of Public Instruction, 1976.
- A Guide to Study of Environment Pollution* by William A. Andrews, Donna K. Moore, and Alex LeRoy. Englewood Cliffs, NJ: Prentice Hall, 1972.
- Our Natural Resources* by Harry B. Kircher, Donald L. Wallace, and Dorothy Gore. 5th ed. Danville, IL: Interstate, 1982. Available from National Farm Book Company.
- Soil and Water Conservation for Productivity and Environmental Protection* by Frederick R. Troeh et al. Englewood Cliffs, NJ: Prentice Hall, 1980. Available from National Farm Book Company.
- Tree Identification.* Columbus, OH: Ohio Agricultural Education Curriculum Materials Services, 1975.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Chain Saw Safety Tips.* A9NXT074.
- Controlling Runoff and Erosion from Land Development Projects: Some Institutional Tools.* G3132.
- Introduction to Conservation Tillage.* A3001.
- Nitrate, Groundwater and Livestock Health.* G3217.
- Pesticides in Groundwater: How They Get there; What Happens to Them; How to Keep Them Out.* G3213.
- Wisconsin's Ground Water: An Invaluable Resource.* G2651.

The following is available from *Successful Farming* magazine.

### *Conservation Tillage Guide*

The following are available from the Wisconsin Department of Natural Resources.

- Journal of Freshwater*
- Project Learning Tree*
- Project Wild*
- Save Wisconsin's Water*
- Sediment, Soil Conservation Service.* 325.
- Water Quality Management*
- Wildlife, People and the Land.* 621.

### **Periodicals**

- American Forests*
- Wisconsin Natural Resources*

## Computer Software

The following are available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Forestry.* Apple.

*Agri-Quiz: Wildlife Conservation.* Apple.

## On-line Computer Networks

The following are available from the Ag Ed Network, AgriData Resources, Inc.

*Tillage and Conservation.* HS172.

*Tillage Choices.* HS173.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Conservation Tillage Equipment: Getting the Most for Your Money.* 11343 (VHS videotape, color, 16 minutes). University of Wisconsin, Department of Agricultural Journalism, 1986.

*Runoff—Land Use and Water Quality.* 01765 (16mm film, color, 22 minutes). University of Wisconsin, Department of Agricultural Journalism, 1978.

*Warming Warnings.* 11776 (VHS videotape, color, 52 minutes). Media Guild, 1985.

*The Wisconsin Forest.* 00452 (16mm film, color, 28 minutes) or 11585 (VHS videotape, color, 28 minutes). University of Wisconsin, Department of Agricultural Journalism, 1976.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Chain Saw Maintenance and Safety.* 302X (41 transparency masters). 1981.

*Soil and Its Properties.* 5008S (64 slides with script). 1971.

The following is available from Vocational Agriculture Services.

*Soil Erosion—The Silent Enemy of the Soil.* F723A (44-frame filmstrip with cassette). 1982.

The following are available from Vocational Media Associates.

*Careers in Conservation.* 07885-93 (Two parts, sound filmstrip with program guide).

*Soil: The Growth Medium.* 30194-93 (Four parts, sound filmstrip with program guide and reproducible masters).

## Estate Planning (10-15 days)

This unit deals with estate planning. Topics include career opportunities, tax laws and reform, estate transfers, and timetables and vehicles of estate planning.

### *Objectives*

- To acquaint students with employment information and career opportunities in the estate planning industry
- To develop student appreciation for estate planning
- To develop student awareness of relevant tax laws at the state and federal level
- To help students explore ways to make effective use of professional advisors on estate planning matters
- To provide students with guidelines for establishing meaningful timetables for planned events
- To increase student understanding of how to analyze for potential liquidity problems in estate transfers
- To acquaint student with ways to assess possible federal and state tax consequences upon death of estate owners
- To prepare students to make more effective use of wills and trusts
- To provide students with practice in developing estate plans
- To develop student appreciation for regularly reviewing estate plans

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the estate planning industry—and relate it to their personal needs and aspirations;
- appreciate the importance of estate planning;
- demonstrate an awareness of relevant tax laws at the state and federal level;
- make effective use of professional advisors on estate planning matters;
- establish meaningful timetables for planned events;
- identify potential liquidity problems in estate transfers;
- determine possible federal and state tax consequences upon death of estate owners;
- make effective decisions concerning the use of wills and trusts;
- develop an appropriate estate plan; and
- appreciate the need for continually reviewing the estate plans.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- Estate planning process [Social Studies]
  - Establishing objectives
  - Estate inventory
  - Timely reviews and updates
- Estate planning team [Careers, Social Studies]
  - Attorney
  - Life underwriter
  - Trust officer
  - Certified public accountant
  - Self
- Timetable for planning
  - First generation
  - Second generation
- Estate taxation
  - Wisconsin inheritance taxes
  - Federal estate tax reform
  - Gift taxation
  - Capital gains tax
- Cash or liquidity analysis upon death [Mathematics]
  - Establishing the gross estate
  - Establishing the adjusted gross estate
  - Establishing the net taxable estate
- Determine the possible tax factors upon death [Mathematics, Social Studies]
  - Marital deductions
  - Jointly held properties
  - Federal tax credits
  - Federal estate taxes
  - State inheritance taxes
- Property values [Careers, Mathematics]
  - Real estate and building
  - Personal property
  - Other valued holding
  - Fair market value
- Purpose of wills and trusts
  - Types
  - Living trusts
  - Drafting wills and trusts
  - Testamentary trusts



- Estate planning decisions
  - Land contract
  - Capital gifts
  - Capital gains sales

### *Motivational Activities*

- Take field trips to county courthouse and local financial institutions.
- Invite resource people to give class presentations.

### *Learning Activities*

- Complete an estate liquidity analysis on a farm or business.
- Visit a Farm Bureau Service Center.

### *Instructional Materials*

#### **Textbooks and References**

- The Appraisal of Farm Real Estate* by Robert C. Suter. 2nd ed. Danville, IL: Interstate, 1980.  
Available from National Farm Book Company.
- Estate Planning—The Book for Farmers* by Robert C. Suter. Danville, IL: Interstate, 1983.
- Estate Planning for Farmers* by J.W. Looney. St. Louis, MO: Doane Information Services, 1979.  
Available from National Farm Book Company.
- Farm Estate and Business Planning* by Neil E. Harl. 9th ed. Niles, IL: Century Communications, 1984.
- Farm Journal's Estate Planning Idea Book*. Edited by Laura Lane. Philadelphia, PA: Farm Journal, 1978.
- How to Plan Your Estates* by Robert Dunaway. 3rd ed. Des Moines, IA: Wallace-Homestead, 1982

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Family Estate Planning in Wisconsin*. B1442.
- Farm Business Arrangements: Which One for You?* NCR50.
- Farm Estate and Transfer Planning: A Management Perspective*. NCR193.
- Farmstead Planning—Zoning and Regulations Checklist*. A2725.
- How Does Inflation Affect Farm Structure?* A9N7T143.
- How Do Income, Estate and Gift Taxes Affect Structure?* A9N6T143.
- Income Tax Management for Farmers*. NCR2.
- Retirement Planning for Farm Families*. NCR49.

The following is available from the Wisconsin Women's Council.

*Wisconsin Marital Property Act Fact Sheet*



## Periodicals

*Agri-View*  
*The Country Today*  
*Farm Journal*  
*The Farmer*  
*Hoard's Dairyman*  
*Wisconsin Agriculturist*

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Tax Plan as Equity Increases.* HS125.  
*Taxing Hedges.* EE4210.  
*Tips on Tax Considerations.* EE510.  
*Transfer Authorization/Sample.* EF4498.  
*Types of Farm Ownership.* HS9.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Anatomy of an Inflation.* 04268 (16mm film, color, 27 minutes). CRM/McGraw-Hill, 1970.  
*Farron Records: The Net Worth Statement.* 11342 (VHS videotape, color, 35 minutes). University of Wisconsin, Department of Agricultural Journalism Video Unit, 1984.  
*Insurance Needs for a Small Business.* 07280 (16mm film, color, 35 minutes). Beacon Films, 1982.

The following are available from Modern Talking Picture Service.

*Estate Planning: A Family Affair.* 16613 (16mm film, color, seven minutes).  
*Your Estate: Planning With Beneficiaries.* 15643 (16mm film, color, 30 minutes).

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## Exploratory Course (45 days)

This unit introduces middle/junior high school students to the world of agriculture education. Topics covered include career opportunities, FFA, animal science, plant science, and natural resources.

### *Objectives*

- To introduce to students the seven agricultural employment clusters
- To enhance student understanding of the FFA as an integral component of the total agricultural program
- To help students develop an understanding of Wisconsin, American, and international agriculture and its importance to people and the economy
- To increase student comprehension of agriculture as an applied science in plant and animal products
- To give students opportunities to examine the role agricultural mechanics and safety programs play in the agricultural industry
- To help students develop an understanding of consumer demands for agricultural products and of the agricultural marketing system

### *Competencies*

At the conclusion of this unit, students will be able to

- appreciate the range of educational and career opportunities in agriculture;
- recognize the unique opportunities presented by the FFA and Supervised Agricultural Experience (SAE) programs;
- demonstrate an awareness of the world's need for agriculture;
- characterize the field of agriculture and related industries in the United States;
- consider relationships between work, education, and lifestyle;
- demonstrate a better understanding of the various concepts and content areas that comprise the agriculture education curriculum at the high school level;
- recognize the presence and significance of agriculture in their lives and in the community;
- identify erosion problems and soil conservation efforts in the local area;
- appreciate the need to develop a safety mindset as a means of reducing occupational hazards;
- identify major technological changes affecting or likely to affect agriculture;
- recognize the various production processes and distribution channels that exist between agricultural producers and the consumer; and
- better understand the relevance of basic skills (reading, writing, spelling, mathematics, and specific content areas) to the world of work generally and to the field of agriculture particularly.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers in agriculture
  - Agriculture education employment clusters
    - Agriculture Science/Production Management
    - Agriculture Processing/Food and Fiber
    - Agriculture Marketing/Distribution and Retail Services
    - Agriculture Supplies and Services
    - Agriculture Mechanization/Engineering and Technical Support Services
    - Agriculture Resources Management
    - Professional Employment in Agriculture
  - Agricultural career statistics
    - Percent of population employed in production agriculture
    - Number of workers employed in agricultural manufacturing and sales
    - Number of workers employed in processing and distributing agricultural products
    - Number of workers employed as science, engineering, management, and financial specialists
    - Number of workers employed as education and communication specialists
    - Future trends in agriculture technology and their effect on careers
- Orientation to the FFA
  - Agriculture education and the FFA
  - History of the FFA
  - Importance of the Supervised Agricultural Experience program to the FFA experience
- American agriculture [Social Studies]
  - Definitions
    - Agribusiness
    - Agriscience
    - Agritechnology
    - Production agriculture
  - Major types of production agriculture
    - Crop production
    - Meat animal/poultry production
    - Dairy production
    - Specialty crops
    - Specialty animals
  - Importance of agriculture to the economy
    - Global population
      - 1. growth rate
      - 2. location of people in relation to food production
    - Global land uses
      - 1. crop land
      - 2. grazing land
      - 3. urban uses (e.g., buildings, roads, parking lots, etc.)
      - 4. other, such as wildlife habitat and recreational land

- **Agriculture in Wisconsin [Social Studies]**
  - Dairying
  - Cereal crops
  - Specialty crops
  - Fruits
  - Vegetables
  - Forest production
  - Livestock production
  - Other agricultural products
- **Basic plant science [Science]**
  - Basic principles of plant growth
    - Preparing soil for planting
    - Planting
    - Germination and growth
  - Horticulture
    - Beauty and aesthetics
    - Need for trained specialists in these areas
    - Importance and value to society
    - Topics to discuss:
      1. flowers
      2. trees
      3. shrubs
      4. turf
      5. landscaping
      6. gardening and garden plants
  - Wisconsin field crop production
    - Corn
    - Oats
    - Barley
    - Wheat
    - Soybeans
    - Forage crops
    - Speciality crops
    - Canning crops
- **Large-animal production, including care and management [Science]**
  - Dairy
  - Beef
  - Swine
  - Poultry
  - Sheep
  - Horses
  - Specialty animals
- **Small animals [Social Studies]**
  - Importance and value to society
    - Fulfill emotional needs
    - Teach important values
    - Provide a profitable business

- Meat products
  - Beef
  - Pork
  - Chicken
  - Turkey
  - Others
- Marketing and the consumer
  - Pricing
  - Processing
  - Quality standards of food products
  - Food products advertisement

### *Motivational Activities*

- Take field trips to facilities and locations related to agricultural or natural resources industries.
- Invite resource people to give class presentations.
- View films, videotapes, and slides on topics related to this unit.
- Post bulletin board displays featuring unit-related topics.
- Organize an FFA chapter at the middle/junior high school level.

### *Learning Activities*

- Participate in an exploratory Supervised Agricultural Experience program.
- Research agricultural careers of interest to you.
- Collect, identify, and display common crops and crop seed.
- Dissect a corn and a bean seed.
- Make simple dairy products, such as butter, yogurt, and ice cream.
- Research a breed of livestock or a species of wildlife.
- Propagate plants.
- Taste test different types of meat and meat products.

### *Instructional Materials*

#### **Textbooks and References**

- Agriculture from the Sextant Series-Personal Profiling.* Milwaukee, WI: Information Systems and Services, 1980. Available from National Farm Book Company.
- Agriculture in Our Lives: An Introduction to Agriculture Business and Natural Resources* by Alfred H. Krebs. 5th ed. Danville, IL: Interstate, 1984.
- Agriculture 2000: A Look at the Future.* Columbus, OH: Battelle Press, 1983. Available from Federal Intermediate Credit Banks.
- Crop Production* by Richard J. Delorit and Louis Greub. Engelwood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Exploring Agriculture* by Roy Luther Donahue and Everett F. Evans. Engelwood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- FFA Student Handbook.* Alexandria, VA: Future Farmers of America, 1984. Available from National FFA Supply Service.
- Handbook of Agricultural Occupations* by Norman Kurtz Hoover. Danville, IL: Interstate, 1985. Available from National Farm Book Company.

*Introductory Horticulture* by H. Edward Reiley and Carroll L. Shry, Jr. 2nd ed. Albany, NY: Delmar, 1983. Available from National Farm Book Company.

*Livestock and Poultry Production* by Ronald V. Bundy and Clarence E. Diggins. 5th ed. Engelwood Cliffs, NJ: Prentice Hall, 1982. Available from National Farm Book Company.

*The Meat We Eat* by John R. Romans et al. 12th ed. Danville, IL: Interstate, 1984. Available from National Farm Book Company.

*Modern Agricultural Mechanics* by Truman Jeremiah Wakeman. Danville, IL: Interstate, 1977. Available from National Farm Book Company.

*Modern Livestock and Poultry Production* by James R. Gillespie. Albany, NY: Delmar, 1985. Available from National Farm Book Company.

*Official FFA Manual*. Alexandria, VA: Future Farmers of America, 1988. Available from National FFA Supply Service.

*Soils: An Introduction to Soils and Plant Growth* by Roy Luther Donahue et al. Engelwood Cliffs, NJ: Prentice Hall, 1983. Available from National Farm Book Company.

*Supervised Occupational Experience Handbook*. Alexandria, VA: Future Farmers of America, n.d. Available from National FFA Supply Service.

*Wisconsin Agricultural Statistics*. Madison, WI: Department of Agriculture, Trade and Consumer Protection, 1988. Available from the Wisconsin Agriculture Statistics Service.

*Yearbook of Agriculture* from the United States Department of Agriculture. Washington, DC: U.S. Government Printing Office, 1988.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Beef Cattle Breeds*. AF2228.

*Chain Saw Safety Tips*. A9NXT074.

*Fertilizing Small Fruits in the Home Garden*. A2307.

*4-H Dairy Calf Project Materials*

*How Good Is Your Land?* A1222.

*Identify Your Cattle*. A2834

*Profitable Forages*. A2466.

*Raising Livestock on Small Farms*. AF2224.

*Safe Use of Farm Tractors*. A8MNF623.

*Sampling Soils for Testing*. A2100.

*Small Grain Production in Wisconsin*. A2471.

*Weeds of the North Central States*. A9NXP281.

*Wisconsin Farm Accidents*. A2375.

### Periodicals

*Agri-View*

*The Country Today*

*Farm Journal*

*The Farmer*

*FFA New Horizons* (formerly *The National Future Farmer*)

*Hoard's Dairyman*

*Wisconsin Agriculturist*

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Beef Breeds.* CSU372.

*Crops Enterprise Selection.* HS132.

*Dairy Housing Systems.* HS80.

*FFA Proficiency Introduction-Index.* FF150.

*Sheep and Lamb Marketing.* HS423.

*Swine Production.* CSU651.

## Films, Video Tapes, Slides

The following is available from the Bureau of Audio Visual Instruction.

*Agribusiness Is Everybody's Business.* 06804 (16mm film, color, 21 minutes). Wisconsin Department of Agriculture, 1969.

The following are available from the Grange Farm Film Foundation.

*Agri-America 2003 A.D.* (16mm film, color, 20 minutes.) 1983.

*Careers in Produce Distribution.* (16mm film, color, 17 minutes.) 1982.

The following is available from the Walter J. Klein Company.

*America's Soil: The Eroding Foundation.* (16mm film, color, 28 minutes.) 1983.

The following is available from Modern Talking Picture Service, Inc.

*Everything but the Oink.* 15535 (16mm film, color, 13 minutes).

The following are available from Nasco.

*Breeds of Dairy Cattle.* C10243N (38-frame color filmstrip).

*Careers in Agricultural Equipment and Mechanics.* C10264N (50-frame color filmstrip with taped narration).

*Careers in Agricultural Production.* C10169N (48-frame color filmstrip with taped narration).

*Careers in Forestry.* C10375N (Color filmstrip with cassette).

*Exploring Supervised Occupational Experience Programs.* C11918N (46-frame color filmstrip).

*Grades of Eggs.* OT250N (Base and five overlays).

*Shop Tool Identification.* C1930N (Set of 24 transparencies).

## Equipment and Facilities

The following are available from Nasco.

*Cheesemaking Kit.* SB13733N (Complete set for 30 students, in teams of two).

*Crop Plants.* C11118N (40 full-color photographs of crop plants in four stages—seed, seedling, mature plant, and flower).

*Guide to Horses.* C7920N (Guide and chart).  
*Identification of Retail Meat Cuts.* C12165N (125 full-color flash cards).  
*Nitrogen Cycle Chart.* C9700N (Chart with teacher's guide).  
*Rootview.* C9679N (Growth chamber with study guide).  
*Safety Charts for Power Tools.* C11920N (Nine plastic-laminated charts).  
*Soil Capillary Water Demonstration.* C8976N (Set includes rack, pan, and six soil tubes).  
*Soil Study Kit.* C9633N (Set includes a 13-minute, 55-frame color filmstrip; pots, growing media, fertilizer, and seed; 14 study cards; and a teacher's manual).  
*The Water Test Kit.* SB7202N (Set with instruction booklet to test water samples for dissolved oxygen content, chlorides, phosphates, hydrogen sulfide, and water hardness).



## **Farm Business Income and Expense Records (45-90days)**

This unit deals with farm income and expense records. Topics include career opportunities and employment information, types of farm records, terminology, farm record forms, tax forms, and advantages of proper farm records.

### *Objectives*

- To acquaint students with employment information and career opportunities in farm recordkeeping
- To have students recognize the importance of yearly tax records and accuracy with all farm records
- To instruct students in the use of recordkeeping books
- To provide opportunities for students to use farm account and financial record books in developing monthly cash flows, family living budgets, and farm filing systems
- To differentiate between capital income and capital expense

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job description, job availability, personal and educational requirements, opportunity for advancement, and other factors relative to potential employment in farm recordkeeping—and relate it to their personal needs and aspirations;
- understand the need for and importance of accuracy in keeping farm records;
- utilize farm tax forms and record books;
- enter and balance farm income and expenses in the farm record book;
- calculate monthly cash flow and family living expenses;
- complete the labor forms and year-end farm records for income tax purposes;
- explain the difference between capital income and expenses; and
- develop a farm filing system and understand debt repayment.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Federal tax forms and schedules used for farm records
  - 1040—Federal Tax Form
  - Schedule A—Itemized Deductions and Schedule B—Interest Income
  - 1040-D—Capital Schedule
  - 1040-E—Rental Schedule
  - 1040-F—Farm Schedule

- 1040-SE—Social Security Schedule
- 1040-3468—Investment Credit Schedule
- 1040-3800—General Business Credit
- 1040-4136—Gas Tax Credit Schedule
- 1040-4255—Recapture of Investment Credit Schedule
- 1040-4562—Depreciation
- 1040-4797—Gains and Losses of Exchanges of Capital Items

• Types of farm records [Mathematics]

- Income records
  - Purchased "Held for Resale" items
  - Sale of capital items
  - Milk income
  - Other operating income (hay, calves, crops, etc.)
  - Government payments
  - Accounts receivable
- Expense records
  - Capital purchases
  - Futures accounts
  - Labor costs
  - Farm operating expenses
  - Special expenses (1099s, etc.)
  - Monthly livestock inventory check
  - Annual livestock inventory check
- Credit records
  - Farm credit record
  - Credit summary
  - Accounts payable
- Family living records
  - Nonfarm personal credit record
  - Family living expenses
  - Nonfarm wage income
  - Record of investment income (nonfarm)
  - Nonfarm business (income and expenses)
  - Nonfarm capital sales
  - Farm produce used in home
  - Family savings, investment, and cash summary
- Miscellaneous records
  - Silo capacities
  - Monthly cash balance
  - Accuracy check
  - Cash flow plan and record
  - Income tax projection worksheet
  - Annual crop production summary
  - Monthly feed use worksheet
- Farm record terminology
  - Capital assets
  - Short-term capital assets
  - Long-term capital assets

Business capital assets  
Depreciable capital assets  
Nondepreciable capital assets  
Cost basis  
Adjusted tax basis  
Personal property  
Personal real estate  
Farm personal property  
Farm real estate property

- Required farm records [Mathematics]
  - Income information
  - Expense information
  - Depreciation records
  - Capital gains or losses
  - Investment credit records
  - Employee compensation records
  - Bank statements and records
  - Income and expense receipts
- Federal tax form storage
  - Income or tax deduction records—three years after due date of tax return
  - Employment tax returns—four years after due date of employment tax return
  - Capital assets or improvement records—indeinitely, or at least as long as four years after the final disposition and payment for final disposition of the asset is made
- Advantages of proper farm records [Social Studies]
  - Assures full amount of legal deductions
  - Enables computation of depreciation allowances
  - Enables computation of investment credit
  - Enables computation of capital gains and losses
  - Identifies the sources of business cash and property received
  - Tax return audit assistance
  - Enables effective tax management
  - Peace of mind

### *Motivational Activities*

- Invite a local farmer to give a firsthand account on the importance of keeping complete, accurate records.
- Provide examples of farm record books.
- Demonstrate the computer software programs available for farm recordkeeping.
- Invite an Internal Revenue Service representative to discuss audits.
- View films, videotapes, and slides on unit-related topics.

### *Learning Activities*

- Develop a farm account book.
- Fill in a farm account book.
- Prepare records for a tax consultant.

- Develop a partial budget.
- Develop a complete budget.
- Develop a cash flow budget.
- Develop a family living budget.
- Develop a farm filing system.
- Complete a labor summary for tax reports.

### *Instructional Materials*

#### **Textbooks and References**

- Doane's Facts and Figures for Farmers.* 4th ed. Bloomington, MN: Doane Information Services, 1981. Available from Nasco.
- Farm Accounting and Business Analysis* by Sydney C. James and Everett Stoneberg. 3rd ed. Ames, Iowa: Iowa State University Press, 1986.
- Financial Management in Agriculture* by Peter J. Barry and C.B. Baker. 3rd ed. Danville, IL: Interstate, 1983.
- Managing Your Financial Future: Farm and Family Records* by R.A. Luening. Book one. 4th ed. Richland Center, WI: Richland Observer, 1987.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Equalized Value, Assessed Value and Your Property Tax Bill.* G3365.
- The Farm Corporation: What It Is—How It Works—How It Is Taxed.* NCR11.
- Farm Records Example.* A7801211.
- Federal Income Tax Incentives for Conservation and Pollution Control Practices.* A7790409.
- How Do Income, Estate, and Gift Tax Policies Affect Structure?* A9N6T143.
- How Federal Income Tax Rules Affect Ownership and Control of Farming.* NCR37.
- Income Tax Management for Farmers.* NCR2.

The following is available from the Internal Revenue Service.

*Your Federal Income Tax.* Annual publication.

The following is available from Doane Agricultural Service, Inc.

#### *Tax Management Guide*

The following is available from the United States Department of Agriculture.

*Agricultural Outlook Charts.* A-55. Annual publication.

#### **Periodicals**

- Crops and Soils*
- Doane's Agricultural Report*
- Drovers Journal*

*Farm Journal*  
*Successful Farming*  
*Wisconsin Agriculturalist*

### **Computer Software**

The following is available from Hobar Publications.

*4 Farm Profit.* IBM.

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Blank Cashflow Sheet: Livestock.* FE2700.

*Calculating Interest Payments.* HS22.

*Computers for Farm Accounting.* HS59.

*Computers to Keep Dairy Records.* HS215.

*Determining Cash Flow.* HS43.

*Determining Depreciation.* HS41.

### **Laboratory Resources**

The following is available from the Internal Revenue Service.

*Understanding Taxes—Student Workbook*

### **Films, Videotapes, and Slides**

The following is available from the Bureau of Audio Visual Instruction.

*Farm Records: The Net Worth Statement.* 11342 (VHS videotape, color, 35 minutes). University of Wisconsin, Department of Agricultural Journalism, 1984.

The following is available from Doane Agricultural Service, Inc.

*Increasing Earnings through Farm Records.* (Filmstrip.)

The following is available from the Grange Farm Film Foundation.

*In Pursuit of Excellence—Agricultural Excellence.* (16mm film, color, 13 minutes.)

### **Equipment and Facilities**

Student calculators

Computer/printer

## FFA Organization (20-28 days)

The FFA is the national organization of, by, and for students of vocational agriculture and agribusiness. The FFA provides for the practical application of technical skills, plus leadership, cooperation, and citizenship—all of which vital to successful employment in modern agriculture. FFA activities combine classroom instruction, laboratory activities, and the Supervised Agricultural Experience (SAE) programs.

### *Objectives*

- To develop student awareness of the relationship of FFA to agriculture education
- To familiarize students with the history and development of the FFA
- To enhance student comprehension of the structure and organization of the FFA
- To give students opportunities to examine the aims and purposes of the FFA
- To acquaint students with the requirements for FFA membership and degree qualifications
- To emphasize to students the importance of the duties and responsibilities of FFA chapter members and officers
- To acquaint students with the functions of FFA officers and members in chapter meetings
- To inform students of the essentials for a good FFA chapter
- To familiarize students with a chapter program of work
- To enhance student awareness of the importance for cooperation, service, and citizenship
- To acquaint students with supervised agricultural experience program planning and development
- To familiarize students with the FFA Alumni Association and its relationship with the FFA
- To familiarize students with the state FFA Foundation and its relationship with the FFA

### *Competencies*

At the conclusion of this unit, students will be able to

- demonstrate an understanding of the relationship of the FFA to agriculture education;
- demonstrate an awareness of the history and development of the FFA organization;
- identify opportunities presented by the FFA related to their interests and goals;
- outline the structure and organization of the FFA;
- become an FFA member;
- demonstrate an understanding of FFA degree qualifications;
- recognize and exhibit good leadership in a wide range of contexts;
- function more effectively as part of a working group;
- demonstrate improved public speaking skills and greater confidence speaking in front of groups;
- develop a supervised agricultural experience program appropriate for career opportunities;
- recognize the structure and organization of the FFA Alumni Association and its affiliates; and
- recognize the importance of the FFA Foundation.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Agriculture education and the FFA
  - Relationship of FFA to agricultural education and Public Law 740
  - Importance to the local school

- Chapter contributions to the school and community
- State and national associations
- History and development
  - Significance of the National Vocational Education Act
  - Purposes of agricultural clubs prior to 1928
  - Founders of the FFA
  - Impact of early national livestock judging contests
  - How the FFA became an organization
  - Code of ethics
  - Proper use of the official FFA jacket
- Operation of the FFA organization
  - Symbols, emblem, and colors of the organization
  - Financing and how the organization is governed
  - Local, state, and national officers
  - Role of adults in the organization
  - Aims and purposes
  - Motto and creed of the organization
  - Dues structure
  - Organizational chart
  - Administrative chart
- Membership and degrees
  - Kinds of membership and policies
  - Degrees of active membership and qualifications
  - Pins and symbols
- Leadership [Careers]
  - Styles of leadership
  - Formal and informal leadership
  - Qualities desired in an individual
  - Functions of democratic leadership
  - Opportunities for development
  - Role of local, state, and national organization in promoting leadership
  - The importance of teamwork
- Personal and social development
  - Personal appearance
  - Proper behavior and manners
  - Social code of ethics
  - Traits to avoid
  - Getting along with people
  - Working with people
  - Starting and maintaining conversations
  - Being a good listener
  - Telephone conversations
  - Introductions

- Public speaking [Careers]
  - Developing a speech
    - Selecting a subject
    - Obtaining references
    - Preparing the speech
    - Delivery
    - Visual aids and body language
    - Proper breathing
    - Pronunciation and enunciation
    - Grammar usage
  - Types of speeches
    - Memorized
    - Deliberative
    - Extemporaneous
- Duties and responsibilities of FFA officers and members [Careers]
  - Incentives to become a participating member
  - Qualities of an effective member
  - Qualities of an effective officer
  - Duties of chapter officers
  - Leadership activities for officers and members
  - Officer responsibility in conducting program of activities and chapter meetings
  - Chapter, state, and national officer qualifications
- Planning and conducting chapter meeting [Careers]
  - Chapter equipment
  - Meeting room arrangement
  - Planning the agenda
  - Order of business
  - Responsibilities of members and officers
  - Opening and closing ceremony
  - Essentials of a chapter meeting
  - Minutes and financial records
  - Symbols of each officer
  - Proper parliamentary procedure (See the "Parliamentary Procedure" instructional unit.)
- Chapter program of activities [Careers]
  - The executive committee
  - Guidelines in selecting activities
  - Planning a program of activities
  - Calendar of activities
  - National awards program for chapters
  - Program of activities, goals, and ways and means
  - FFA Alumni Association
  - State FFA Foundation
  - The value of committees
  - Chairperson's responsibility in carrying out activities
  - Committees' responsibility in carrying out activities
  - Committees' responsibility for evaluating activities
  - Building Our American Communities (BOAC)



- National foundation and awards program
  - Types of contests and awards available
  - Value of participation
  - Developing student confidence
  - Basic levels of recognition in the FFA
  - Relationship of the National FFA Foundation, Inc. to FFA
  - Objectives, eligibility, and sponsoring of each award
  - Past chapter contests and award achievement
  - Awards available for members
  - Means of raising award funds
- Parent and member banquet [Careers]
  - Reasons for holding a banquet
  - Member participation
  - Planning and conducting the banquet
  - Committee responsibilities
  - Role of a state FFA officer
- National FFA activities and functions
  - Functions conducted on the national level
  - Opportunities at the national level
  - Convention proceedings
  - Leadership and citizenship conference proceedings
  - FFA Supply Service
  - *FFA New Horizons* (formerly *The National Future Farmer*) magazine
  - The official FFA calendar
  - Reasons for state and national convention
  - Career show at the national convention
  - International education programs (e.g., work experience abroad)
  - BOAC
- The American flag
  - History and development of the American flag
  - Proper flag display
  - Respect for the American flag
  - Handling the flag
  - Proper way to pledge allegiance to the flag
  - Official proportions of the American flag
  - Laws governing the use and treatment of the flag
  - Meaning of the stars and stripes and the three colors
  - Proper disposal of a worn-out flag
  - Reasons for flying a flag at half-mast

### *Motivational Activities*

- Invite state or national FFA officer or FFA Alumni members to give a classroom presentation.
- Post bulletin board displays featuring topics related to the FFA.
- View films, videotapes, and slides on FFA-related topics.

- Compile an FFA scrapbook.
- Visit with former outstanding FFA members.
- Display recent FFA trophies and plaques that the chapter has received.
- Invite former award-winning FFA members to speak to the class on the benefits of participating in the FFA contest and awards program.
- Make available to the class the FFA supply catalog.
- Display FFA award applications on the chapter bulletin board.
- Post the FFA calendar and display the FFA magazine.
- Organize Agriculture Career Day for students and their parents.
- Develop FFA Week promotions.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program related to FFA leadership.
- Develop a list itemizing FFA's contributions to agriculture education.
- List the relationships between FFA activities and agriculture education.
- Complete a "Leadership Traits" checklist.
- Conduct a creed speaking, prepared public speaking, or extemporaneous speaking contest.
- Prepare an organizational chart that shows how the FFA is governed.
- Review award applications.
- Invite an FFA executive committee member to address the class on how to plan a meeting.
- Demonstrate proper table manners and etiquette.
- Organize a parliamentary procedure team contest.
- Review state and national program activities.
- Create a wall chart depicting the chapter program of activities and display it in the classroom.
- Videotape student FFA speeches.
- Demonstrate proper telephone techniques.
- Practice making formal introductions.
- Conduct a parent-member banquet-planning exercise.
- Demonstrate the proper way to fold the flag.
- Develop a Food for America program, activities for Agriculture Week, and other related activities that tell the story of agriculture.
- Develop a BOAC program to encourage community development.

### *Instructional Materials*

#### **Textbooks and References**

- FFA Advisors Handbook*. Alexandria, VA: National FFA Organization, 1981. Available from National FFA Supply Service.
- FFA Student Handbook* by Don Erickson and Martha Erickson, eds. 8th ed. Alexandria, VA: National FFA Organization, 1985. Available from National FFA Supply Service.
- The How in Parliamentary Procedure* by Kenneth L. Russell. Danville, IL: Interstate, 1981. Available from National Farm Book Company.
- Roberts Rules of Order* by Henry M. Roberts. Danville, IL: Interstate, 1981. Available from National Farm Book Company.
- When You Preside* by John D. Lawson. 5th ed. Danville, IL: Interstate, 1980. Available from National Farm Book Company.

## Bulletins and Pamphlets

The following are available from the National FFA Supply Service.

*Agricultural Proficiency Awards Handbook*. 1985.

*FFA Leadership and Personal Development*. Set of 10. LPD1-10.

*FFA Official Manual*. OM.

*FFA Organization, What It Is—What It Does*. OP-1.

*Preparing for Progress—A Career for You In Agriculture*. PFP.

*What Is FFA?* OP-2.

## Periodicals

*FFA New Horizons* (formerly *The National Future Farmer*)

## Computer Software

The following are available from ACS Software Publishing.

*FFA I*. Apple.

*FFA II*. Apple.

The following are available from Hobar Publications.

*FFA Leadership Record*. Apple.

*FFA and Vo-Ag Record Summary and Analysis*. Apple, IBM.

*Parliamentary Procedure and FFA Review*. Apple, IBM.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: FFA*. Apple, IBM.

*Micro-Tutor: Parliamentary Procedure*. Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Conduct of Meeting*. Apple, IBM.

*Agri-Quiz: FFA Instruction*. Apple, IBM.

*Agri-Quiz: Parliamentary Procedures, Part I*. Apple, IBM.

*Agri-Quiz Parliamentary Procedures, Part II*. Apple, IBM.

## On-line Computer Networks

The following is available from Ag Ed Network, AgriData Resources, Inc.

*Computers in Ag Award Form*. FFA227.

*Computers in Ag Award Info*. FFA276.

*Developing Proficiency Award Programs*. FFA163.

*FFA Leadership Development*. CLF510.

*FFA Proficiency Award Purpose*. FFA151.

*FFA Proficiency Award Intro/Index.* FFA150.  
*Leadership.* CLF500.  
*Non-Indexed FFA Reports.* FFA369.  
*Parliamentary Procedure.* CSU221.  
*Parliamentary Procedure (DIR).* CLF520.  
*Parliamentary Terms.* CSU222.  
*Proficiency Award Advisors Statement.* FFA183.  
*Qualifications for Proficiency Award.* FFA152.

### **Films, Videotapes, and Slides**

The following are available from the National FFA Supply Service.

*Agriculture's New Generation.* ANGR-6 (16mm film, 21 minutes) or SS-ANG-1 (128 slides with cassette, 15 minutes). National FFA Organization, n.d.  
*Be All You Can Dream.* BAYCD (16mm film or videotape). National FFA Organization, 1984.  
*Building Our American Communities.* SS-BOAC-85 (130 slides with cassette, 12 minutes). National FFA Organization, 1982. Available in 16mm film from the University of Wisconsin-River Falls.  
*Choices, Challenges, Changes.* CCC-VHS (VHS videotape, 20 minutes).  
*Consider the Possibilities.* (16mm film, 21 minutes). Farmers Home Administration, n.d.  
*FFA—The Learning and the Land.* LL-6 (16mm film, 20 minutes). National FFA Organization, n.d.  
*FFA—Preparing for Progress.* SS-PPF-80 (110 slides with cassette, 16 minutes). National FFA Organization, 1980.  
*FFA Alumni: It's Happening.* SS-ASC-2 (63 color slides with cassette, ten minutes). National FFA Organization, 1982.  
*FFA Stars Over America.* F-STA-VHS (VHS videotape, 22 minutes). National FFA Organization, 1987. Available in 16mm film from Venard Films.  
*Food for America—Presenter's Guide.* FAV-86 (41 slides with cassette, five minutes). National FFA Organization, 1975.  
*Keeping America on the Grow—Vocational Agriculture and FFA.* SS-KAG-83 (140 slides), FS-KAG-83 (Filmstrip, 18 minutes), RF-KAG-83 (Film rental), or F-KAG-83 (16mm film, 18 minutes). The Wrangler Brand, 1983.  
*Safety Makes Sense.* SS-SASS-2 (80 slides with cassette, ten minutes). National FFA Organization, 1982.  
*Sights and Sounds of the National FFA Convention.* SS-FNC-82 (50 slides with cassette). National FFA Organization, 1982.  
*SOE—Now More Than Ever.* SOEA-SS (80 slides with cassette, 12 minutes).  
*Supporting Your Program of Activities.* FS-POA-84 (80-frame filmstrip with cassette, 15 minutes).  
*VO-AG/FFA Growing for America.* SS-GFA-81 (140 slides with cassette, 23 minutes). National FFA Organization, 1981.  
*WEA/FFA Uniting the World with Agriculture.* SS-WEA-80 (120 slides with cassette, 13 minutes). National FFA Organization, 1980.

The following are available from Midwest Agribusiness Services, Inc.

*Parliamentary Procedure Contest.* (VHS videotape, 24 minutes.) 1986.  
*Parliamentary Procedure in Review.* (VHS videotape, 57 minutes.) 1986.

The following is available from Venard Films.

*Convention Time: Everybody's Winner.* (16mm film, 26 minutes.) Ciba-Geigy Corporation, 1986.

### **Equipment and Facilities**

The following are available from the National FFA Supply Service.

*Building the FFA Emblem.* Overhead transparencies.

*FFA Creed.* Wall chart.

*FFA Aims and Purposes.* Wall chart.

## **Financial Planning and Estate Transfer of Family-Held Business (5-15 days)**

This unit deals with estate transfers of family-held businesses. Topics include career opportunities, estate planning, taxations, ownership structure and exchanges, insurances, retirement planning, and vehicles of estate transfer.

### *Objectives*

- To acquaint student with employment information and career opportunities in the estate transfer industry
- To enhance student understanding of the estate planning process and associated team
- To increase comprehension of estate taxations and the economic changes—including death—that influence tax rates
- To introduce factors that determine property values and the use of wills and trusts
- To assist students in comparing "gift" advantages and disadvantages
- To acquaint students with various business-related insurance
- To analyze life insurance types and uses
- To emphasize the importance of adequate retirement planning
- To develop an understanding of estate transfer vehicles

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the financial-planning industry—and relate it to their personal needs and aspirations;
- understand the importance of estate and financial planning;
- make decisions about establishing the business structure;
- evaluate farm real estate and personal property;
- understand the various types of wills and how they work to increase or decrease estate taxes;
- effectively use gifts as an estate transfer vehicle;
- determine the appropriate type and amount of insurance on an individual basis;
- understand the various types of life insurance and how they can be advantageously used to accomplish the family's goals;
- plan an adequate retirement plan using IRS-approved tax deductible plans; and
- discuss estate transfer devices.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- The estate planning process [Social Studies]
  - Establishing objectives
  - Estate inventory
  - Choosing the proper methods
  - Timely reviews and updating
- The estate planning team [Careers, Social Studies]
  - Attorney
  - Life underwriter
  - Trust officer
  - Certified public accountant
  - Self
- Timetables for planning
  - First generation
  - Second generation
- Estate taxation
  - Federal estate tax reforms
  - Wisconsin inheritance tax
  - Gift tax
  - Capital gains tax
- Economic changes [Mathematics]
  - Inflation
  - Cash flow
  - Untimely owner-operator death or disability
  - Taxation at progressive tax table levels
    - Income taxes
    - Death taxes
- Business structure
  - Sole ownership
  - Partnerships
  - Corporations
- Self-analysis of potential cash or liquidity problems at death [Mathematics]
  - Establishing the gross estate
  - Establishing the adjusted gross estate
  - Establishing the net taxable estate
- Tax consequences at death [Mathematics, Social Studies]
  - Marital deductions
  - Jointly held properties
  - Federal tax credits
  - Federal estate taxes
  - State inheritance taxes

- Property values [Careers, Mathematics]
  - Real estate and building
  - Personal property
  - Other valued holding
  - Fair market value
- Purpose of wills and trusts
  - Types
  - Living trusts
  - Testamentary trusts
  - Drafting wills and trusts
- Advantages and disadvantages of gifts
  - Purposes
    - Gifts to spouses
    - Gifts to children
    - Gifts to charities
  - Given properties
  - Annual exclusion allowance gift
  - Lifetime gifts
  - Tax consequences of gifts
- Purchasing property and casualty insurance on the business [Mathematics]
  - Insuring to value
  - Co-insurance
  - Deductibles
  - Maximum liability limits
- Purchasing health and disability insurance [Mathematics, Social Studies]
  - Policy renewable features
  - Maximize total coverage
  - Inflating medical costs
  - Deductibles
- Life insurance types and uses [Social Studies]
  - Term insurance
  - Permanent insurance
    - Future money concept
    - Investment myth
    - The advantage of the level premium concept in whole life products
  - Life insurance ownership
    - Taxation avoidance
    - Insurable interest of owner
    - Personally owned insurance versus credit life



- Survivor life insurance concept for family-owned businesses **[Mathematics]**
  - Contract terms
  - Benefits
  - Underwriting advantages
  - Ownership flexibility
  - Reduced costs
  - Annual exclusion gifts to third parties to pay premiums
- Planning an adequate retirement **[Mathematics]**
  - Planned liquidation of present assets
  - Tax deferred plans
  - Income tax advantages
  - Funding products
    - Certificates of deposit
    - Mutual funds
    - Stocks and bonds
    - Annuities
- Estate transfer procedures **[Mathematics]**
  - Purchase by land contract
    - Inhibit the inflation problem
    - Lower interest rate
    - Lower down payment
    - Valuation break
  - Gifts
    - Annual exclusion gifts
    - Tax-free limitations
    - Lifetime gift taxation
  - Cash purchases
    - Interest rates
    - Down payment requirement
    - Capital gains considerations

### *Motivational Activities*

- Take a field trip to county courthouse.
- Take a field trip to a local financial institution.
- Invite resource speakers to address the class.
- View films, videotapes, and slides on unit-related topics.

### *Learning Activities*

- Complete an estate liquidity analysis on a simulated farm or business.
- Use a computer to complete the analysis.
- Create bulletin board displays on topics related to this unit.
- Use liquidity analysis forms.
- Visit a Farm Bureau Service Center.

## ***Instructional Materials***

### **Textbooks and References**

- The Appraisal of Farm Real Estate* by Robert C. Suter. 2nd ed. Danville, IL: Interstate, 1980.  
Available from National Farm Book Company.
- Estate Planning—The Book for Farmers* by Robert C. Suter. Danville, IL: Interstate, 1983.
- Estate Planning for Farmers* by J.W. Looney. St. Louis, MO: Doane Information Services, 1979.  
Available from National Farm Book Company.
- Farm Estate and Business Planning* by Neil E. Harl. 9th ed. Niles, IL: Century Communications, 1984.
- Farm Journal's Estate Planning Idea Book* by Laura Lane. Philadelphia, PA: Farm Journal, 1978.
- How to Plan Your Estate* by Robert M. Dunaway. 3rd ed. Des Moines, IA: Wallace-Homestead, 1982.
- Keeping What's Yours: Estate Planning After Tax Reform* by J.R. Graham and C.S. Arthur, III. Manhattan, KS: R.L. DeBruyn and Associates, 1977.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Family Estate Planning in Wisconsin*. B1442.
- Farm Business Arrangements: Which One for You?* NCR50.
- Farm Estate and Transfer Planning: A Management Perspective*. NCR193.
- Farm Real Estate*. NCR51.
- Farmstead Planning—Zoning and Regulations Checklist*. A2725.
- How Do Income, Estate and Gift Tax Policies Affect Structure?* A9N6T143.
- How Does Inflation Affect Farm Structure?* A9N7T143.
- Income Tax Management for Farmers*. NCR2.
- Retirement Planning for Farm Families*. NCR49.

The following is available from the Wisconsin Women's Council.

*Wisconsin Marital Property Act Fact Sheet*

### **Periodicals**

- Agri-View*
- The Country Today*
- Farm Journal*
- The Farmer*
- Hoard's Dairyman*
- Wisconsin Agriculturist*

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

- Tax Plan as Equity Increases*. HS125.
- Taxing Hedges*. EE4210.

*Tips on Tax Considerations.* EE510.  
*Transfer Authorization/Sample.* EF4498.  
*Types of Farm Ownership.* HS9.

### **Films, Videotapes, and Slides**

The following are available from the Bureau of Audio Visual Instruction.

*Anatomy of an Inflation.* 04268 (16mm film, color, 27 minutes). McGraw-Hill, 1970.  
*Insurance.* 11994 (VHS videotape, color, 20 minutes). PBS Video, 1982.  
*Insurance Needs for a Small Business.* 07280 (16mm film, color, 16 minutes). Beacon Films, 1982.  
*Retirement Planning: Thinking Ahead.* 11054 (VHS videotape, color, 13 minutes). Coronet, 1985.

The following are available from the Media Resources Center.

*Planning For Retirement.* S52211H (VHS videotape, color, 25 minutes). Beacon Films, 1985.  
*Towards Retirement.* S38624F (VHS videotape, color, 25 minutes). Washington Film Company, 1981.  
*Your Will and Estate.* S52210H (VHS videotape, color, 25 minutes). Beacon Films, 1985.

The following is available from Modern Talking Picture Service.

*Your Estate: Planning With Beneficiaries.* (16mm film, color, 30 minutes).

## **Fish and Fish Management (5-15 days)**

This unit deals with the basic concepts of fish and fish management. Topics include career opportunities; history of fish management; fish species; lake, stream, and river management; lake, stream, and river habitats; water quality; and marketing of fish products.

### *Objectives*

- To acquaint students with employment information and career opportunities in the fish and fish management industry
- To develop student understanding of the history of fishing and fish management in Wisconsin
- To increase student awareness of fish species common to Wisconsin, regarding habitat, life cycles and value as food and sport
- To develop student understanding of the role and activities of the Wisconsin Department of Natural Resources (DNR) studies concerning the study and regulation of fish in the state
- To acquaint students with the techniques of catching each species of fish, specific structures, water temperature, bait, tackle and care of fish after catching
- To develop student understanding of the "catch-and-release" concept
- To enhance student comprehension of proper fish preparation and handling from lake to table

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relevant to potential employment in the fish and fish management industries—and relate it to their personal needs and aspirations;
- list jobs related to fish and fish management;
- name training stations, working conditions, and jobs that are available locally;
- define sport fishing, commercial fishing, and fish management practices in Wisconsin;
- identify game fish species common to Wisconsin waters;
- identify rough fish species common to Wisconsin waters;
- recognize appropriate habitat required for each game and rough fish species;
- list fishing resources available from the DNR;
- understand Wisconsin fishing rules and regulations;
- list appropriate angling means for each fish species;
- explain the "catch and release" philosophy;
- describe the "chain of life" in streams, ponds, lakes, and rivers;
- show proper methods for scaling or filleting; and
- demonstrate one method of preparing fish for the table.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job description
  - Training requirements

- Working conditions
- Opportunity for advancement
- Other factors
- History of fishing and fish management in Wisconsin
  - Early fish population and species studies
  - Species available in late 1800s and early 1900s
  - Early rules and regulations
- Fish species [Science]
  - Game fish
    - White and striped bass
    - Largemouth, smallmouth, and meanmouth bass
    - Rock and redeye bass
    - Walleye, sauger, and perch
    - Tiger silver, lake, and spotted muskellunge
    - Northern pike and pickerel
    - Brook, lake, rainbow, German brown, speckled, and tiger trout
    - Coho, king, and chinook salmon
    - Pumpkinseed, green, and longear sunfish
    - Bluegill
  - Rough fish
    - Mirror, amur, and common carp
    - Black, white, and hog-nosed redhorse
    - Chubs
  - Baitfish and minnows
    - Shiners
    - Fatheads
    - Daces
- Lakes [Science]
  - Types
    - Eutrophic
    - Mesotrophic
    - Oligotrophic
  - Habitats and zones
    - Limnetic zone
    - Littoral zone
    - Benthic zone
    - Profundal zone
    - Thermozones
- Streams [Science]
  - Types
    - Permanent streams
    - Intermittent streams
    - Interrupted streams

- Habitat and zones
  - Thermozones
  - Viscosity zones
  - Benthic zone
  - Littoral zone
  - Profundal zone
- Management of lakes, ponds, and reservoirs [Science, Social Studies]
  - Shoreline restrictions
  - Spawning habitat construction
    - Cribs
    - Rock structures
    - Artificial weedbeds
  - Boating regulations
  - Weed cutting
  - Dredging
- Management of rivers and streams [Science, Social Studies]
  - Dredging
  - Habitat structures for diversions
    - Rock
    - Wood
    - Plants
- Water quality [Science, Social Studies]
  - Environmental Protection Agency (EPA) standards
  - Wisconsin DNR standards
  - Acid rain
- Fish management [Science, Social Studies]
  - Slot sizes
  - Catch and release
  - Size limits
  - Creel limits
  - Artificial stocking
  - Kill-out
  - Fishing regulations
    - Commercial
    - Sport
    - Treaty
  - Feeding systems
    - Hatchery
    - Ponds
- Marketing fish products [Careers, Science, Social Studies]
  - History
  - Market outlets
  - New products

- Fishing
  - Rods and reels
  - Terminal tackle (line, hooks, sinkers, leaders)
  - Lures (jigs, spoons, spinners, plugs, pork rinds)
  - Live bait (worms, nightcrawlers, leeches, minnows, insects)
  - Appropriate rigging of natural and artificial baits (presentations)
  - Structure fishing
  - pH and water temperature
  - Flashers, graphs, liquid crystal recorders
  - Handling and preparation of fish from lake to table
  - Ice fishing techniques

### *Motivational Activities*

- Take a field trip to a fish hatchery.
- Invite resource speakers to give class presentations.
- View films, videotapes, and slides on topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Compile a list of career opportunities in the fishing and fish management industry.
- Interview sporting goods dealers on new fishing techniques and products.
- Set up an aquarium and stock it with native species.
- Demonstrate how to determine the age of a fish by examining its scales.
- Dissect a fish and identify parts of its anatomy.
- Demonstrate basic fly tying, how to pour lead jigs and sinkers, or how to fillet a fish.

### *Instructional Materials*

#### **Textbooks and References**

- Environmental Conservation* by Raymond F. Dasmann. 5th ed. New York: John Wiley and Sons, 1984.
- Getting the Most From Your Game and Fish* by Robert Candy. Putney, VT: Alan C. Hood Publishing, 1984.
- Guide to the Study of Freshwater Ecology* by W. Andrews. Englewood Cliffs, NJ: Prentice Hall, 1971.
- McClane's Field Guide to Freshwater Fishes of North America* by A.J. McClane. New York: Holt, Rinehart, and Winston, 1978.

#### **Pamphlets and Bulletins**

The following are available from the Cooperative Extension Service.

- Acid Rain Measurements: What They Mean.* G3305-2
- The Lake in Your Community.* G3216
- Nonpoint Pollution: Agricultural Runoff in Wisconsin.* G2979
- Nonpoint Pollution: Causes and Consequences.* G2956
- Nonpoint Pollution: What Does It Mean for Wisconsin's Waters?* G2962
- The Supply and Demand for Yellow Perch.* R3006

The following are available from the Wisconsin DNR.

*Fish Management in Wisconsin.* (Reprinted from *Wisconsin Natural Resources*, May/June 1983).

Lake Michigan Game Fish Fact Sheets

*Brook Trout*

*Brown Trout*

*Chinook Salmon*

*Coho Salmon*

*Lake Trout*

*Rainbow Trout*

Wisconsin Fish Life History, Ecology and Management Booklets

*Black Crappie*

*Bluegill*

*Largemouth Bass*

*Muskellunge*

*Northern Pike*

*Rock Bass*

*Sauger*

*Smallmouth Bass*

*Walleye*

*White Crappie*

*Yellow Perch*

Wisconsin fishing poster

Periodicals

*Fins and Feathers*

*Fish and Wildlife Reference Service Newsletter*

*Fishing Facts*

*In-Fisherman*

*Wisconsin Natural Resources*

*Wisconsin Sportsman*

Computer Software

The following is available from Hobar Publications.

*Fish and Wildlife of the Upper Midwest and Related Review.* Apple, IBM, TRS, Macintosh.

Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Fish—The Food with a Catch to It.* 04562 (16mm film, color, 11 minutes). Centron, 1978.

*Living River.* 01249 (16mm film, color, 20 minutes). Moyer, 1974.

*Salmon Story.* 09121 (16mm film, color, 28 minutes). University of Wisconsin, Sea Grant Institute, 1973.



The following are available from the Media Resources Center.

*The Bony Fishes.* (Life on Earth Series.) S40357V (¾-inch, V-matic videotape, color, 20 minutes). Penn Communications, 1981.

*Lake of Perch: The Food Chain.* S38668F (16mm film, color, 13 minutes). Motorola Teleprograms, 1981.

*Lake of Perch: Winter.* S8678F (16mm film, color, 11 minutes). Teleprograms, 1981.

*Salmon on the Run.* S67029H (VHS videotape, color, 58 minutes). Time-Life Films Multimedia Division, 1983.

*Secret Life of a Trout River.* S27962F (16mm film, color, ten minutes). National Geographic Society, 1974.

*A Trout Stream in Winter.* S48407F (16mm film, color, 18 minutes). Pennsylvania State College, 1979.

The following is available from the Leisure Time Products.

*Anatomy of a Trout Stream.* (VHS videotape, color.)

The following is available from the Wisconsin DNR, La Crosse office.

*DNR Fish Management.* (116 slides.)

#### Equipment and Facilities

Minnow seine

Minnow traps

Classroom aquarium

Fly rod

Spinning rod

Assorted hooks

Bait casting rod

Tip-ups for ice fishing

Assorted jigs, spinners, surface, sinking baits

Down riggers

Aquarium

Tank suitable for raising fish

## Floriculture Science (14 days)

This unit deals with basic areas involved in floriculture in Wisconsin. Topics include career opportunities, identifying flower varieties, developing floral arrangements, and operating a floral business.

### *Objectives*

- To acquaint students with employment information and career opportunities in the floriculture industry
- To increase student awareness of the different types of retail floral operations
- To develop student understanding of the history of the floriculture industry
- To provide students with guidelines for selecting an appropriate inventory for a floral shop
- To enhance student understanding of procedures for purchasing, caring for, and selling high quality cut flowers
- To give students instruction and practice in the design and creation of appropriate floral arrangements for various occasions
- To prepare students to conduct routine floral shop customer transactions
- To provide instruction in the design and creation of appropriate corsages for different occasions
- To review procedures involved in the design and preparation of a wedding package appropriate for different types of weddings
- To illustrate how to select, design, and create appropriate floral arrangements for funerals
- To prepare students to perform typical tasks in the floriculture industry in a safe and efficient manner

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the floriculture industry—and relate it to their personal needs and aspirations;
- identify and explain the advantages and disadvantages of different floral outlets;
- explain how the floriculture industry developed;
- identify and describe the tools and materials used in flower arranging;
- determine the types of floral containers used for various arrangements;
- identify specific types of flowers used in floral arrangements;
- care for cut flowers;
- assemble, calculate, and complete billing invoices; and
- use proper safety techniques.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements

- Working conditions
- Opportunities for advancement
- Other factors
- Types of retail flower shops
  - Average flower shops
  - High-class shops
  - Retail-grown combination shops
  - College town shops
  - Shopping center flower shops
  - Hospital shops
  - Cash-and-carry shops
  - Hotel shops
  - Apartment house flower shops
  - Department store shops
  - Bachmans's European flower market
  - Mini-shops
- History of flower arranging
  - Oriental flower arrangements
  - European flower arrangements
  - Modern American arrangements
- Tools and equipment used in flower arranging
  - Knives, shears, and scissors
  - Pin holders
  - Florist clay
  - Floral foams
  - Floral tapes
  - Florist wires
- Containers
  - Low bowls and oblong forms
  - Square containers
  - Cylindrical and rectangular forms
  - Pitcher- and urn-shaped forms
  - Flared and natural vases
  - Plain versus decorated containers
  - Neutral versus bright-colored containers
  - Simple versus unusual shaped containers
  - Size and texture of containers
- Selection of flowers
  - Line flowers
  - Round or focal flowers
  - Filler flowers
  - Greens

- Source and care of flowers [Social Studies]
  - Where and how to buy flowers
  - The cost of buying flowers
  - Lifespan, maturity stages, and stem length of flowers
  - When and how to cut flowers
  - How to condition flowers
  - How to maintain flower arrangements
- Uses and characteristics of flowers, plants, and decorative materials
  - Cut flowers
  - Flowering pot plants
  - Foliage plants
  - Florist greens
- Basic principles of floral design
  - Design
  - Line
  - Form
  - Texture
  - Color
  - Harmony
  - Focal point
  - Balance
  - Proportion and scale
  - Rhythm
  - Repetition
- Types of arrangements
  - Centerpiece
  - Round and oval
  - Crescent
  - S-curve
  - Symmetrical
  - Asymmetrical
  - Rectangular
  - Diagonal
  - Zigzag
  - Vertical
  - Spiral
  - Basket
  - Bud vases
  - Fruit baskets
  - Dish gardens (terrariums)
  - Other
- Corsages
  - Determine body flowers for various occasions and individuals
    - Holidays

- Special occasions
  - Birth
  - Illness
  - Death
  - Weddings
- Religious occasions
- Social group organizations
- Hobbies
- Costume materials
- Age, size, sex, and personality of customer
- Tools for corsage making:
  - Water picks
  - Wire sizes and their use
  - Floral tapes
  - Floral paints and dyes
  - Netting
  - Ribbon (kinds, sizes, and colors)
  - Corsage pins (kinds and sizes)
  - Chenille stems
  - Decorative novelties and materials
- Types of corsages
  - Shoulder
  - Neckline
  - Wrist
  - Waist
  - Hair
  - Nosegay
  - Novelty
- Weddings
  - Kinds of weddings
    - Very formal weddings
    - Formal weddings
    - Semi-formal weddings
    - Informal weddings
  - Customs and expenses
    - Origination of wedding customs
    - Bride's expenses
    - Groom's expenses
    - Optional expenses
    - Other
  - Wedding bouquet styles
    - Bride's bouquet
    - Bridesmaid flowers
    - Ring bearer and flower girl flowers
    - Corsages and boutonnieres
    - Church and altar flowers
    - Reception flowers

- Funerals
  - Selection of funeral arrangements
    - Time of year
    - Sex and age of deceased
    - Local customs
    - Other
  - Types of funeral arrangements
    - Baskets
    - Sprays
    - Wreaths
    - Religious and conventional designs
    - Fraternal designs
    - Other

### *Motivational Activities*

- Take field trips to floral shops, greenhouses, and wholesale flower shops.
- Invite a florist to give a demonstration of flower arranging to the class.
- Post a bulletin board display featuring topics related to this unit.
- View films, videotapes, and slides on floriculture science.
- Develop a floriculture project for the class.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Survey the community to determine the number and kind of floral outlets in the area.
- Demonstrate the use of floral design tools.
- Prepare a display of floral containers.
- Collect pictures and specimens of a number of flowers.
- Create weekly a floral arrangement for display in the school.

### *Instructional Materials*

#### **Textbooks and References**

- Floral Design and Arrangement* by G. McDaniel. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1981.  
Available from National Farm Book Company.
- Flowers: Geometric Form* by M. Benz and James L. Johnson. College Station, TX: San Jacinto Publishing, 1980.
- Greenhouse Flowers and Bedding Plants* by George S. Williams and Ronald L. Shumack. 2nd ed. Danville, IL: Interstate, 1983.
- Ornamental Horticulture Experience Program Planning Guide and Record Book* by Paul E. Hemp. Danville, IL: Interstate, 1970.
- The Retail Florist Business* by Peter B. Pfahl and P. Blair Pfahl, Jr. Danville, IL: Interstate, 1983.  
Available from National Farm Book Company.
- Working in Horticulture* by William B. Richardson and Gary Moore. New York: McGraw-Hill, 1980.

## Bulletins and Pamphlets

The following are available from Cooperative Extension Service.

*Flower Arranging*. NCR211.  
*Flowering Potted Plants*. A1596.  
*Hanging Baskets*. A2937.  
*Roses for the Home*. A8MI1929.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*A Manual for Flower Judging*. 225X. Pi Alpha Xi National Honorary Fraternity, 1983.

## Periodicals

*Horticulture: The Magazine of American Gardening*  
*Rodale's Organic Gardening*

## Computer Software

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Annuals I and II*. Apple, IBM.  
*Micro-Tutor: Perennials I and II*. Apple, IBM.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Floriculture*. Apple, IBM.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Flowers at Work*. 10038 (16mm film, color, 16 minutes). Encyclopaedia Britannica Education Corporation, 1982.  
*Foliage Plants for Interiors*. 08077 (16mm film, color, 15 minutes). Rutgers, 1972.

The following are available from Nasco.

*Preserving Flowers and Foliage*. C12754N (64-frame color filmstrip with study guide).  
*Wiring and Taping Flowers and Foliage*. C12753N (53-frame color filmstrip with study guide).

The following are available from Ohio Agricultural Education Curriculum Materials Service.

*Corsage Construction*. 2082S (101 color slides with script) or 2083N (Script only). 1980.  
*Dried Materials*. 2064S (71 color slides with script) or 2065N (Script only). 1978.  
*Easter Lilies*. 2068S (31 color slides with script) or 2069N (Script only). 1979.  
*Foliage Plants*. 2009S (172 color slides with script). 1983.  
*Poinsettia*. 2048S (97 color slides with script) or 2049N (Script only). 1986.

The following is available from the Vocational Media Associates.

*Flower Arranging*. 30752-93 (Five filmstrips with cassettes, program guide, and reproducible masters).

The following is available from Teaching Aids, Inc.

*Flower Arranging Made Simple*. Two parts. R-VT1039 and R-VT1040. (VHS videotape, 60 minutes.)

The following are available from Vocational Agriculture Services.

*Foliage Plant Identification*—Part I. S610 (49-frame slideset).

*Foliage Plant Identification*—Part II. S611 (49-frame slideset).

*Foliage Plant Identification*—Part III. S612 (55-frame slideset).

The following are available from Vocational Education Productions.

*The Basic Floral Design Kit*. 1-220-230H (Two color filmstrips with cassettes and scripts).

*Contemporary Floristry*. 1-222-200H (Three color filmstrips with cassettes and teaching guide).

*The Flower Identification Slide Set Series*. 1-273-240H (100 color slides and four student workbooks with binder).

*Ornamental Horticulture Plant Identification Slide Library*. 1-272-201H through 1-272-204H (Four sets, 50 color slides in each set).



## Forages—Legume (10-20 days)

This unit deals with legume forages. Topics include career opportunities; importance, distribution, and characteristics of legumes; soil and climatic requirements; seed selection; culture; management; diseases; insects; and plant quality.

### *Objectives*

- To acquaint students with employment information and career opportunities in the legume forage industry
- To help students evaluate the feed value of various forages
- To provide students with guidelines for selecting appropriate leguminous forage species and varieties given soil and climatic conditions
- To instruct students in how to identify leguminous forages common to the area
- To develop student understanding of proven management practices for raising leguminous hay crops
- To increase student understanding of the various uses of leguminous forages
- To help students recognize and treat disease and insect problems affecting leguminous hay crops
- To acquaint students with the various methods for harvesting leguminous crops
- To acquaint students with ways to reduce the risks of winterkill in leguminous crops
- To give students opportunities to examine ways to use forage analysis data to increase leguminous forage value

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement and other factors relative to employment in the leguminous forage industry—and relate it to their personal needs and aspirations;
- contrast the plant characteristics of legumes grown in the area;
- examine the suitability of commonly grown leguminous crops for hay, pasture, silage, and green manure;
- discuss the varieties of legumes available to area farmers;
- select varieties of the various species of legumes with the best performance potential for the area;
- calculate correct seeding rates of the various legumes;
- discuss the climatic and soil requirements of legumes;
- discuss management practices that result in high yields and longevity of the crop;
- compare the protein content and yield of legumes and nonlegumes;
- demonstrate knowledge of the procedure of and benefits from inoculating legumes;
- describe the characteristics of a good seedbed;
- list and compare advantages of different seeding methods;
- explain the reasons for depth of seeding for different legumes;
- explain the fertility needs of the crop;
- describe the symptoms and measures used in controlling the diseases of leguminous hay crops;
- explain recommended management practices;

- describe the different methods of harvesting;
- contrast harvesting methods of legume crops;
- discuss the characteristics of leguminous crops, the damage insects cause and effective control measures;
- list and explain the causes and practices that can be used to reduce winterkill; and
- demonstrate awareness of the up-to-date forage analysis.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Importance and distribution
  - Origin of the crop
  - Area where grown
  - Present acreage and trends
  - Reasons for its popularity
  - Disadvantages of each species of legumes
  - Species common to local area
- Soil and climate requirements [Science]
  - Fertility needs
  - Type of soil, depth, drainage, sensitivity to acid
  - Range of climatic conditions
  - Moisture requirements
- Selecting the seed [Science]
  - Varieties of each legume species
  - Varietal differences with respect to yield, habit of growth, quality of hay, and resistance to cold, drought, and disease
  - Origin of seed and its importance
  - Characteristics of certified seed
- Culture of legumes [Mathematics, Science]
  - Reasons for inoculating legumes
  - Preparation of the seedbed
    - Characteristics of a good seedbed
    - Implements to use in preparing the seedbed
  - Soil acidity, its affect on the establishment and yields of legumes
  - Proper pH level and materials to use for correcting acidity
  - Soil sampling and testing
  - Kind and amount of fertilizer to apply
  - The importance of trace elements
  - Methods and time of sowing

- Rate and depth of sowing
- Plant food deficiency symptoms
- Methods of harvesting and maintaining crop quality
- Management of legumes
  - Hay production—number of cuttings and when to cut
  - Plant maturity relationships
  - Pasture production—time and extent of grazing
  - Reducing the danger of bloat
  - The fertility program and its relationship to yield and longevity of stands
  - Winterkill—its causes and the management practices used to reduce losses
- Diseases [Science]
  - Types
  - Cause
  - Symptoms
  - Prevention
  - Control measures
- Insects [Science]
  - Characteristics of the insect
  - Method of injuring the plant
  - Symptoms of the injured plant
  - Control measures
- Forage Quality
  - Characteristics of high quality forage
  - Visual examination for quality factors
  - Infrared forage testing

### *Motivational Activities*

- Take field trips to local farms and test trial plots.
- Post bulletin board displays or create charts depicting the ways in which legumes are beneficial to the soil.
- View films, videotapes, and slides on topics related to this unit.

### *Instructional Materials*

- Participate in a Supervised Agricultural Experience program.
- Collect, identify, and prepare mounts of
  - leguminous plant, leaf, root, and seed specimens;
  - leguminous plants damaged by insects; and
  - diseased legume plants.
- Conduct germination tests on legume seeds.
- Collect, prepare, and send samples of the following to a forage laboratory for evaluation:
  - hay
  - haylage
  - silage

## Textbooks and References

- Approved Practices in Crop Production* by Elwood A. Brickbauer and William P. Mortenson. 2nd ed. Danville, IL: Interstate, 1978. Available from National Farm Book Company.
- Crop Production* by Richard Delorit and Louis Greub. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Crop Production: Principles and Practices* by Darrel S. Metcalfe and Donald M. Elkins. 4th ed. New York: Macmillan, 1984.
- Forages* by Maurice E. Heath et al. 3rd ed. Ames, IA: Iowa State University Press, 1973.
- Producing Farm Crops* by Lester V. Boone et al. 3rd ed. Danville, IL: Interstate, 1981. Available from National Farm Book Company.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Alfalfa Analyst*. A2417.
- Alfalfa Diseases I & II*. A700601, A7800602.
- Alfalfa for Beef Cows*. A8MOAFBC.
- Characteristics of Forage Legumes and Grasses*. A2906.
- A Complete Forage Plan for Wisconsin Livestock*. A2550.
- Forage Tests and Computerized Balanced Rations Really Pay*. A7780109.
- Managing Manure on Alfalfa*. A3336.
- Winter Injury to Forages*. A2905.

The following are available from the Minnesota Extension Service.

- Alfalfa Disease in the Midwest*. AG-BU-1925. 1984.
- Alfalfa Verticillium Wilt*. AG-FS-2027. 1983.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

- Approved Practices of Forage Production*. 111X. Pennsylvania Instructional Materials Service, 1978.

## Periodicals

- Hoard's Dairyman*
- Ford New Holland News* (formerly *Sperry New Holland News*)
- Wisconsin Agriculturist*

## Computer Software

The following is available from Agri-Education, Inc.

- Forage Management*. Apple.

The following is available from Control Data.

*Forage Crop Production.* IBM.

The following is available from Hobar Publications.

*Grasses and Legumes and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Forage Production.* Apple.

#### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Computers for Crop Management.* HS214

*Computers for Crop Production.* HS212.

*Computers to Keep Crop Records.* HS213.

*Hay/Forage Marketing Decisions.* HS363.

*Labor Needs: Crop Enterprise.* HS138.

*Method of Alfalfa Harvest.* CSU341.

#### Films, Videotapes, and Slides

The following is available from the Bureau of Audio Visual Instruction.

*Alfalfa Scouting in the Upper Midwest.* 11347 (VHS videotape, color, 13 minutes). University of Wisconsin, Department of Agricultural Journalism, 1987.

The following are available from Hobar Publications.

*Crop, Hay, and Silage Judging.* D3 (53 slides with cassette, 19 minutes).

*Legume Crops.* D26 (115 slides).

*Seedling Identification of Legume Plants.* D6 (24 slides with cassette, 15 minutes).

The following is available from Photocom.

*Forage Crop Harvest and Storage.* 30-753 (VHS videotape, 45 minutes).

The following are available from Teaching Aids, Inc.

*Forage Crop Production: Seeding and Establishing Forage Crops.* CD15400751 (VHS videotape, 45 minutes).

*Managing the Established Crop: Harvest, Storage, and Management—Parts I and II.* CD15400752 (Part I, VHS videotape, 40 minutes) and CD15400753 (Part II, VHS videotape, 45 minutes)

The following are available from Vocational Agriculture Services.

*Diseases of Alfalfa*. 113X (42-frame color filmstrip with script). 1978.

*Diseases of Clovers*. 114X (40-frame color filmstrip with script). 1978.

#### Equipment and Facilities

Variety of forage samples

## Forages—Nonlegume (10-20 days)

This unit deals with nonlegume forages. Topics include career opportunities, species origin, culture, disease and insect control, and management.

### *Objectives*

- To acquaint students with employment information and career opportunities in the nonlegume forage industry
- To provide students with instruction and practice in identifying various species of nonleguminous forage plants
- To develop student understanding of the climate and soil requirements of nonlegumes
- To assist students in comparing seeding rates for several nonleguminous hay crops
- To enhance student comprehension of the characteristics of a good seedbed
- To assist students in comparing seeding methods for hay crops
- To help students recognize nutrient deficiencies in nonleguminous hay crops
- To acquaint students with management practices leading to higher yields and increased stand longevity
- To introduce students to guidelines for selecting varieties of nonleguminous plants for high yield hay crops
- To assist students in evaluating several nonleguminous plant species for use as hay, green manure, pasture, and silage
- To develop student understanding of procedures for preventing and controlling disease and insect infestations in nonleguminous crops
- To give students opportunities to analyze differences in the nutrient value of leguminous and nonleguminous hays

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the production of nonlegume forage crops—and relate it to their personal needs and aspirations;
- describe the climate and soil requirements of nonlegumes;
- explain the plant characteristics of nonleguminous hay crops grown in this area;
- contrast the suitability of commonly grown nonleguminous crops for hay, pasture, silage, and green manure;
- discuss the species of nonleguminous hay crops that are commonly grown in this area;
- select varieties of various species of nonlegumes that are commonly grown for hay and have the best yield potential;
- list and discuss the characteristics of a good seedbed;
- recognize plant-food deficiency symptoms in nonleguminous hay crops;
- explain the relationship between crop maturity and nutritive value; and
- discuss the relative importance of disease and insects in the production of nonleguminous hay crops.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Importance and distribution [Science, Social Studies]
  - Origin of the species
  - Areas where grown
  - Present acreage and trends
  - Reason for its popularity
  - Disadvantages of the various species of nonlegumes grown for hay
- Characteristics [Science]
  - Plant description
    - Height
    - Hardiness
    - Longevity
    - Leaf and root characteristics
- Soil and climate requirements [Science]
  - Type of soil
  - Soil drainage and its effect on plant growth
  - Fertility needs
  - Temperature and moisture conditions
- Crop culture [Mathematics, Science]
  - Time of sowing
  - Use of companion crops
  - Seeding mixtures
  - Rate of seeding
  - Depth of seeding
  - Fertilization
  - Preparation of the seed bed
  - Plant food deficiency symptoms
- Crop uses [Mathematics]
  - Hay production
    - Management practices
    - Species recommended
  - Pasture production
    - Management practices
    - Species recommended
  - Silage
    - Relative value
    - Species recommended

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- Seed production
  - Production location
  - Harvesting method
  - Harvesting concerns
- Diseases [Science, Social Studies]
  - Symptoms
  - Diagnosis
  - Control measures
- Insects [Science, Social Studies]
  - Symptoms
  - Diagnosis
  - Control measures

### *Motivational Activities*

- Take field trips to local farms and test plots.
- Post bulletin board displays or create charts depicting the different uses of nonleguminous forages.
- View films, videotapes, and slides on topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect, identify, and prepare mounts of
  - nonleguminous plant, leaf, root, and seed specimens;
  - nonleguminous plants damaged by insects; and
  - diseased legume plants.
- Conduct germination tests on nonlegume seeds.
- Observe or take part in a silage- or haylage-making exercise.
- Participate in a forage judging exercise.

### *Instructional Materials*

#### **Textbooks and References**

- Approved Practices in Crop Production* by Elwood A. Brickbauer and William P. Mortenson. 2nd ed. Danville, IL: Interstate, 1978. Available from National Farm Book Company.
- Crop Production* by Richard Delorit and Louis Greub. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Forage Management* by Dale Smith et al. 5th ed. Dubuque, IA: Kendall/Hunt, 1986. Available from National Farm Book Company.
- Producing Farm Crops* by Lester V. Boone et al. 3rd ed. Danville, IL: Interstate, 1981. Available from National Farm Book Company.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Characteristics of Forage Legumes and Grasses.* A2906.  
*Pest Management in Wisconsin Forages and Small Grains.* A1981.  
*Oats For Forage.* A2590.  
*Perennial Legume Forage Crop Variety Update for Wisconsin.* A1525-1.  
*Profitable Forages.* A2466.  
*Sac Smooth Bromegrass.* A2042.  
*Seed Treatments to Control Small Grain and Forage Diseases.* A1453.  
*Supplementary and Emergency Forage Crops.* A1119.  
*Take a Good Forage Sample.* A2309.  
*Verdant Timothy.* A2216.  
*Winter Injury to Forages.* A2905.

## Periodicals

*Agri-View*  
*The Country Today*  
*Crop Production*  
*Wisconsin Agriculturist*  
*Wisconsin Forager*

## Computer Software

The following are available from Hobar Publications.

*Grasses and Legumes and Related Review.* Apple, IBM, TRS, Macintosh.  
*Hay and Forage Harvesting Equipment and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Forages.* Apple, IBM.

The following is available from Midwest Agribusinesses Services, Inc.

*Agri-Quiz: Small Grains.* Apple, IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Hay/Forage Marketing Decisions.* HS363.  
*Identifying Hay Market Routes.* HS359.  
*Markets for Hay.* HS354.

## Laboratory Resources

Crop plant mounts.

## Films, Videotapes, and Slides

The following are available from the Gehl Company.

*Hay Today*. (16mm film, color, 30 minutes). 1980.

*Hay Tools Headquarters*. (16mm film, color, 14 minutes). 1983.

The following are available from Hobar Publications.

*Crop, Hay and Silage Judging*. D3 (53 slides with cassette, 19 minutes).

*Grass Crops*. D25 (183 slides).

The following is available from Photocom.

*Forage Crop Harvest and Storage*. 30-753 (VHS videotape, color, 45 minutes).

The following are available from Teaching Aids, Inc.

*Forage Crop Production: Seeding and Establishing Forage Crops*. CD15400751 (VHS videotape, 45 minutes).

*Managing the Established Crop: Harvest, Storage, and Management—Parts I and II*. CD15400752 (Part I, VHS videotape, 40 minutes) and CD15400753 (Part II, VHS videotape, 45 minutes).

## Forest Science (90 days)

This unit deals with forest science. Topics include career opportunities, tree identification, measurement of land and forest products, land description, nursery management, propagation, site selection, disease and insect control, harvesting procedures, equipment and safety practices, marketing, multiple-use concept, forest laws and policies, and the FFA Forestry Contest.

### *Objectives*

- To acquaint students with employment information and career opportunities in the forest industry
- To familiarize students with the characteristics, habitat and commercial use of common tree species
- To inform students of forestry skills and techniques
- To enhance students awareness of good woodland and forest management factors
- To emphasize to students the importance of nursery management
- To familiarize students with methods of propagation
- To acquaint students with tree planting factors and techniques
- To increase student comprehension of harvesting and marketing wood products
- To inform students about forestry land use options and forest land policies and programs
- To acquaint students with the FFA Forestry Contest

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the forest industry—and relate it to their personal needs and aspirations;
- identify the tree species common to the area;
- recognize the characteristics of tree species used for correct identification;
- discuss the principles of plant growth and reproduction, name the parts of a plant, and describe their function;
- define and explain the "multiple-use" concept in forestry;
- diagram and explain the different harvest methods used to ensure reproduction of desired species;
- list different ways in which seedlings are produced;
- identify site and soil requirements for successful tree propagation;
- list and describe the safety measures in harvesting a tree and cutting it into desired lengths;
- explain different types of logging methods;
- give the size specification and species for types of cut forest products;
- identify insect pests common to trees;
- describe diseases common to trees;
- arrive at the correct compass bearings and size in acres for a designated forest area;
- develop a fire protection plan;
- identify federal and state policies and programs that affect woodlot and forest establishment and management;
- explain the history of forestry in your region;

- develop a marketing plan for forest products;
- describe the principles of Christmas tree production;
- identify tools and equipment used in forest harvest operations; and
- describe the FFA Forestry Contest.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Forestry business organizations
  - Manager
  - Owner-manager-grower
- Tree identification [Science]
  - General and scientific terms
    - Characteristics
    - Habitat
    - Major commercial use
  - Specimens
    - Collection
    - Preparation
- Forestry skills and techniques [Mathematics]
  - Units of measurement
    - Land
    - Forest products
  - Cruiser stick
  - Scaling logs
  - Methods of forest inventory
  - Growth rates
- Woodlands and forests
  - Farm woodlands
  - Industrial forests
  - National, state, county and municipal forests
  - Services from woodlands
  - Forest regions in the United States
  - Woodlands in the national economy
  - History of woodland utilization
  - Phases of woodland management

- Nursery management [Science]
  - Soil requirements
  - Planting seed
  - Protection practices
  - Transplanting
  - Harvesting
- Propagation [Science]
  - Selection
  - Propagation using cuttings
  - Propagation using seeds and nuts
  - Germination time
- Site selection related to proper soils [Science]
- Tree planting
  - Selection factors
  - Ordering
  - Plantation, windbreak, and shelterbelt planning
  - Site preparation
  - Planting techniques
  - Fertilizer usage
  - Maintenance
- Plantation and forest management
  - Protection from
    - Fire
    - Insects
    - Disease
    - Wildlife
    - Competition
  - Management practices that influence growth
- Harvesting trees
  - Logging
  - Transportation
  - Sawmill operation
  - Seasoning lumber
- Marketing wood products [Social Studies]
  - Considerations in marketing
  - Stumpage values
  - Selling
    - Logs
    - Pulp and cordwood
    - Sawed lumber
    - Christmas trees
    - Maple syrup
    - Miscellaneous

- Multiple use of forest lands [Social Studies]
  - Forestry research
  - Forest products
  - Water conservation
  - Range management
  - Wildlife management
  - Recreation
- Forest policies and programs [Social Studies]
- Forest policies and programs [Social Studies]
  - Federal
  - State
  - Private
  - Forestry legislation
- Rules for the state FFA Forestry Contest

### *Motivational Activities*

- Take field trips to
  - a wood lot or small forest;
  - a pulp-processing plant;
  - a lumber company;
  - a sawmill operation;
  - a logging site;
  - a logging contest;
  - a Christmas tree operation; and
  - manufacturers of forest products, such as doors, windows, particle board, and plywood.
- Invite the following resource people to give class presentations
  - a tree farm forester
  - a consulting forester
  - chain saw company representative
  - county forester
- View films, videotapes, and slides on topics related to forestry.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Demonstrate the safe use of a chain saw.
- Plant or prune trees in a nearby wood lot or school forest.
- Demonstrate how to sharpen an ax.
- Identify trees surrounding the school.
- Estimate the number of board feet in standing timber.
- Select and mark trees for cutting.
- Develop plans for applying the multiple-use concept to a nearby forest.
- Conduct experiments with photosynthesis or seed germination.
- Develop a walking trail through a forest and identify its trees.

## Instructional Materials

### Textbooks and References

- Conservation of Natural Resources* by Guy-Harold Smith et al. 4th ed. New York: John Wiley and Sons, 1971.
- Forestry Management Digest* by Brian Ingvalson. 5th ed. Forest Lake, MN: Karen Ann Publishing, 1986.
- Forestry Manual for Vocational Agriculture Instructors* from the Wisconsin Association of Vocational Agriculture Instructors. Madison, WI: Department of Public Instruction, 1976.
- Society of American Foresters* by Karl F. Wenger. 2nd ed. New York: John Wiley and Sons, 1984.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Development Potential of Wisconsin's Red Pine Resource*. R3373.
- Forestry with Confidence*. G7FORCON.
- Pulpwood Demand and Supply in the Wisconsin Pulp and Paper Industry, 1050-1982*. R3375.
- Urban Forestry: Bringing the Forest to Our Communities*. A7791025.
- Wisconsin Woodlands: Estimating Stocking Conditions in Your Timber Stand*. G3362.
- Wisconsin Woodlands: Intermediate Cutting in Forest Management*. G3398.

The following are available from Ohio Agricultural Education Curriculum Materials Service

- Teaching Tree Identification, 1975*. 3002G.
- Tree Identification, 1975*. 3001M.

### Periodicals

- American Forests*
- Forest Farmer*
- Wisconsin Natural Resources*
- Wisconsin Sportsman*

### Computer Software

The following is available from Hobar Publications.

- Fish and Wildlife of the Upper Midwest and Related Review*. Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

- Agri-Quiz: Forestry*. Apple.
- Agri-Quiz: Wildlife Conservation*. Apple.

The following are available from Photocom.

- Micro-Tutor: Pricing*. Apple, IBM.
- Timber Cruising*. Apple, IBM.

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## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Lumber Purlins*. CSU683.

*Lumber Selection*. CSU674.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Changing Forest: A First Film*. 07726 (16mm film, color, 11 minutes). BFA Educational Media, 1970.

*Communities of Living Things*. 09538 (16mm film, color, 15 minutes). Barr Films, 1974.

*Forests Are for People*. 09329 (16mm film, color, 28 minutes). American Forest Institute, 1973.

*Forests in Balance—A Fight Against Time*. 07775 (16mm film, color, 28 minutes). Allen Moore, 1982.

*Roots of a Nation*. 00220 (16mm film, color, 29 minutes). United States Department of Agriculture, 1976.

*Trees and People Need Each Other*. 03788 (16mm film, color, 26 minutes). University of Wisconsin, Department of Agricultural Journalism, 1980.

*Trees for Christmas*. 07779 (16mm film, color, 16 minutes) or 11314 (VHS videotape, color, 16 minutes). University of Wisconsin, Department of Agricultural Journalism, 1976.

*The Wisconsin Forest*. 00452 (16mm film, color, 28 minutes) or 11585 (VHS videotape, color, 28 minutes). University of Wisconsin, Department of Agricultural Journalism, 1976.

The following are available from Nasco.

*Careers in Forestry*. C10375N (Color filmstrip with cassette).

*The Forest*. C10135N (47-frame color filmstrip).

*Identification of Trees*. C10177N (Set of three color filmstrips, 120 frames).

*Managing Forests Through Cutting Practices*. C10139N (62-frame color filmstrip).

*Measuring and Marketing Timber*. C10170N (46-frame color filmstrip).

The following are available from Ohio Agricultural Education Curriculum Materials Service.

*Chain Saw Maintenance and Safety*. 302X (41 transparency masters). 1981.

*Relationship of Hardwood Log and Lumber Grades*. 305S (58 slides with script). 1968.

*Tree Identification*. 303S (220 slides with script). 1977.

The following are available from Vocational Education Productions.

*The Chain Saw and Other Harvesting Tools*. 1-391-233G (Sound filmstrip).

*Hand Tools of the Fire Control Forester*. 1-391-232G (Sound filmstrip).

*Tools for Measuring the Forest*. 1-391-231-G (Sound filmstrip).

## **Fruit Science (10-20 days)**

This unit deals with fruit production. Topics include career opportunities, background and history of fruit production in Wisconsin, fruit and nut production areas, species selection, propagation, cultural practices, harvesting, storage, and marketing.

### *Objectives*

- To acquaint students with employment information and career opportunities in the fruit production industry
- To assist students in understanding the background and history of fruit production in Wisconsin
- To familiarize students with areas suitable for fruit production
- To provide students with knowledge of fruit species and propagation methods
- To increase student understanding of cultural practices in fruit production
- To acquaint students with proven harvesting and storage procedures
- To familiarize students with the efficient marketing of fruit products

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information such—as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the fruit production industry—and relate it to their personal needs and aspirations;
- outline the history of fruit production in Wisconsin;
- explain the extent and nature of fruit production in Wisconsin;
- identify other major fruit production areas at the national and international levels;
- relate the location of production areas to soil conditions, climate, and market locations;
- identify the various fruit species grown in Wisconsin;
- list general cultural requirements of various fruit species;
- explain propagation techniques for various fruit species;
- outline procedures for establishing plantings of various fruit crops;
- list cultural practices associated with specific fruit species;
- explain harvesting and storage procedures for fruit crops; and
- understand the marketing and distribution mechanisms for fruit crops.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- History of fruit production in Wisconsin
- Fruit and nut production [Careers]
  - World
  - United States
  - Wisconsin
    - Temperate zone pomology
    - Orchard site
    - Soils
    - Climatic conditions
    - Growing seasons
  - Locations related to markets
  - Concentrated versus isolated plantings
- Fruit species and methods of propagation [Mathematics, Science]
  - General plant environment
    - Apples
    - Pears
    - Plums
    - Cherries (sour)
    - Walnuts
    - Berries
      1. strawberries
      2. blueberries
      3. raspberries
      4. currants
      5. gooseberries
    - Vines
      1. cranberry
      2. grape
  - Root stocks
    - Propagation
      1. seeds
      2. vegetative propagation
        - cuttings
        - layering
        - budding and grafting
    - Performance
      1. function
      2. growth control
      3. tolerance to different soils
      4. soil pests
    - Types
      1. apple root stocks
      2. pear root stocks
      3. cherry root stocks
      4. grape root stocks
  - Establishing the planting
    - Location

Spacing  
Care of the young orchard  
High density systems

• Cultural Practices [Science]

— Soils

Soil type and texture  
Soil mixture  
Irrigation  
Soil management and weed control  
Nutrient availability  
Fertilizer practice

— Pruning

Apples  
Cherries  
Pears  
Plums  
Walnuts  
Berries  
Vines

• Harvest [Science]

— Preharvest treatment  
— Hand harvest  
— Mechanical harvest  
Shake and catch system  
Pick up harvest system  
— Post-harvest, storage, and nutritional value  
Ripening  
Cold storage  
Quality

• Marketing [Careers]

— Transport  
— Cooperatives

*Motivational Activities*

- Sample various fruit products grown in Wisconsin.
- Post a state map that identifies the location of fruit-growing areas.
- Invite local fruit producers to give class presentations.
- Take field trips to orchards and fruit producing farms.
- Develop group projects on related careers that illustrate educational requirements, skills, and other occupational aspects.
- Demonstrate fruit preservation methods, such as dehydration, canning, and freezing.

## Learning Activities

- Participate in a Supervised Agricultural Experience program.
- Compile a list of careers and occupations related to the fruit industry.
- List all major fruit production areas in the state.
- Interview an orchard owner or fruit producer and report on it to the class.
- Plan an orchard layout.
- Invite a family and consumer economics instructor to discuss fruit preservation.
- Develop marketing strategies for a particular fruit crop.
- Demonstrate vegetative propagation for a variety of fruits.

## Instructional Materials

### Textbooks and References

- Approved Practices in Fruit and Vine Production* by Arnold H. Scheer and E. M. Juergenson. 2nd ed. Danville, IL: Interstate, 1976. Available from National Farm Book Company.
- Fruits and Berries for the Home Garden* by Lewis Hill. Pownal, VT: Storey Communications, 1980. Available from National Farm Book Company.
- Modern Fruit Science* by Norman Childers. 9th ed. Gainesville, FL: Horticultural Publishings, 1983.
- Plant Growth and Development* by Aldo C. Leopold and Paul E. Kriedemann. 2nd ed. New York: McGraw-Hill, 1975.
- Pruning Handbook*. Menlo Park, CA: Sunset Books/Lane Publishing, 1983. Available from National Farm Book Company.
- Temperate Zone Pomology* by Melvin N. Westwood. New York: W. H. Freeman, 1978.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Diseases of Tree Fruits*. NCR45.
- Growing Nuts*. NCR237.
- Home Fruit Cultivars for Southern Wisconsin*. A2582.
- Powdery Mildew of Apple*. A8NYDS4.
- Why Fruit Plants Die*. A3121.

### Periodicals

- American Fruit Grower*
- Fruit Varieties Journal*
- Good Fruit Grower*
- Pomona*

### Computer Software

The following is available from Mid States Agri-Technology Associates, Ltd.

- Micro-Tutor: Pruning*. Apple, IBM.

The following are available from the Midwest Agribusiness Services, Inc.

*Agri-Quiz: Home Fruits and Berries.* Apple.

*Agri-Quiz: Nursery/Landscaping.* Apple.

#### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Fruit Cooperative Membership.* HS116.

*Identify Apple Market Routes.* HS439.

*Sources of Apple Market Facts.* HS442.

#### **Films, Videotapes, and Slides**

The following is available from Hobar Publications.

*Pruning.* H-VT1106 (VHS videotape, color, 56 minutes).

The following are available from Nasco.

*Agricultural Cooperatives.* C10554N (Color filmstrip with cassette).

*Budding and Grafting.* C10433N (Color filmstrip with cassette and script).

*Grape Vineyard Establishment and Maintenance.* C104983N (Color filmstrip with cassette).

*Pruning Orchard Trees.* C10104N (41-frame color filmstrip).

*Strawberry Production.* C12752N (76-frame color filmstrip).

The following are available from Photocom.

*Elements of Pruning.* 01-6012-0 (VHS videotape, 13 minutes).

*Pruning Deciduous Fruit Trees.* 41-011 (Color filmstrip with cassette).

## Gardening (5-15 days)

This unit deals with gardening and the related practices. Topics include career opportunities, planning and preparing the garden site, properly planting the garden, and caring for the garden during the growing season.

### Objectives

- To acquaint students with employment information and career opportunities in the gardening industry
- To develop student appreciation of the economic, avocational, and other rewarding values of gardening
- To introduce students to procedures and principles used in planning gardens
- To familiarize students with procedures for selecting and planting garden sites
- To provide students with instruction in the various management practices used to maintain and care for gardens
- To develop student understanding of harvesting and storage procedures for garden produce

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the gardening industry—and relate it to their personal needs and aspirations;
- develop an appropriate home vegetable garden plan given their specific needs;
- demonstrate proper procedures for preparing a garden seedbed for planting;
- explain procedures for adjusting soil pH and fertility to correct ranges;
- select appropriate vegetable varieties for the garden;
- demonstrate a familiarity with procedures used to start seedlings and plant the garden;
- apply common cultural practices used in gardening, including watering, fertilizing, weather protection, supporting and training plants, and controlling weeds, pests, and disease;
- explain procedures for harvesting and storing vegetable crops, and
- demonstrate the proper procedure for taking a soil test.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

• Planning and preparing the vegetable garden site [Science]

- Location
- Planning the garden
  - Perennials
  - Maturity groupings
  - Cultivation
  - Harvest intervals
- Garden layout
  - Choose a site to fit your needs
  - Planting groups
  - Planning on paper
- Garden soil
  - Soil testing
  - Liming (pH)
  - Preparing the seedbed
- Fertilizing the garden
  - Types of applications
    1. broadcasting
    2. sidedressing
    3. banding
    4. plowing under

• Planning and planting the vegetable garden [Science]

- Selecting varieties
  - Mail order seeds
  - Popular varieties
  - Heirloom varieties
  - Hybrid varieties
  - Open pollinated varieties
  - Storing seeds
- Determining planting time
  - Starting dates (indoor and outdoor)
  - Maturing requirements
- Starting seedlings
  - Soil
  - Containers
  - Methods
  - Light requirements
- Hotbeds
- Cold frames
- Raised beds
- Hardening off
- Transplanting
- Garden tools

• Watering the garden [Science]

- Methods
  - Hand
  - Flooding
  - Irrigation
  - Sprinklers



- Watering frequency
- Watering length
- Fertilizing [Mathematics, Science]
  - Fertilization requirements
  - Methods
  - Fertilizer rates
- Plant protection [Science]
  - Frost
  - Sun
  - Wind
  - Rain
- Support and training plants [Science]
  - Cages
  - Homemade methods
  - Trellis
- Controlling weeds [Science]
  - Preventing weeds
  - Herbicides
    - Dangers
    - Kind used
  - Cultivation
    - Tools used
  - Mulches
- Controlling plant pests and insects [Science]
  - Roles of insects
    - Pollination
  - Sucking insects
  - Chewing insects
  - Controlling insect problems
    - Pesticides
    - Insecticides
    - Baits
    - Physical control
  - Organic control
    - Beneficial insects
    - Biological and natural pests
  - Safety
- Animal control [Science]
  - Above and below ground
- Combatting diseases
  - Types
  - Control methods
    - Chemical
    - Disease-resistant plants
    - Cultural controls

- Prevention of diseases
- Soil-borne diseases
  - Root rot
  - Wilt
  - Nematodes
  - Molds
  - Blights
  - Leaf spots
  - Rust
- Harvesting [Science]
  - Harvesting techniques
  - Harvesting dates
  - Product use
- Storage techniques [Science]
  - Root cellars
  - Winter hotbeds
  - Storage bins
  - Garbage can minicellars
  - Preservation
    - Canning
    - Freezing
    - Drying

### *Motivational Activities*

- Take a field trip to a local garden center or a commercial producer's farm.
- Invite resource people, such as the following, to give class presentations:
  - a garden supply dealer
  - a produce manager from a grocery store
  - a member of a local garden club or botanical society

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program in garden production.
- Organize or take part in a garden or vegetable crop show or a largest-vegetable contest.
- Building a cold frame or a hotbed.
- Collect insects that are harmful and beneficial to garden plants.
- Report on a particular vegetable species.
- Draw a garden plan to scale.
- Take a soil sample.
- Prepare a soil seed-starting mix.
- Order seeds and plants from a garden catalog.
- Calculate the percentage of germinating seeds.
- Propagate tubers indoors.
- Plant a garden.
- Transplant seedlings.
- Plot out a garden area before planting.
- Estimate the cost for a complete garden plan.

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- Plant a garden and sell the produce to a local supermarket.
- Build a trellis for climbing plants.
- Collect specimens of weeds that commonly grow in a garden.
- Taste test a variety of vegetables.
- Grow a vegetable crop indoors.
- Collect at least ten garden tips from friends.

## *Instructional Materials*

### Textbooks and References

- Down-to-Earth Vegetable Gardening Know-How* by Dick Raymond. Pownal, VT: Garden Way Publishing/Storey Communications, 1982. Available from National Farm Book Company. 1975.
- Gardening Techniques* by Lee Foster. San Francisco: Ortho Books, 1984.
- Home Gardening Wisdom* by Dick Raymond and Jan Raymond. Pownal, VT: Garden Way Publishing/Storey Communications, 1982. Available from National Farm Book Company.
- Horticulture: A Basic Awareness* by Robert F. Baudendistel. 2nd ed. New York: Prentice Hall, 1982. Available from National Farm Book Company.
- Introductory Horticulture* by H. Edward Reiley and Carroll L. Shry, Jr. 2nd ed. Albany, NY: Delmar, 1983. Available from National Farm Book Company.
- Joy of Gardening* by Dick Raymond. Pownal, VT: Storey Communications, 1983. Available from National Farm Book Company.
- Producing Vegetable Crops* by George W. Ware and J. P. McCollum. 3rd ed. Danville, IL: Interstate, 1980.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Growing Vegetables at Home—Questions and Answers*. A2801.
- Growing Your Own Vegetables*. AAB409.
- The Vegetable Garden*. A1989.
- Vegetable Cultivars and Planting Guide for the Wisconsin Garden*. A1653.

### Periodicals

- Garden*
- Garden* (formerly *Garden Journal*)
- Horticulture*
- Plants & Gardens: Brooklyn Botanic Garden Record* (formerly *Plants and Gardens*)
- Rodale's Organic Gardening*

### Computer Software

The following is available from Hobar Publications.

- Horticulture and Related Review*. Apple, IBM, TRS, Macintosh.

The following are available from Vocational Education Productions.

*Ortho's Computerized Gardening* Apple, IBM.

#### Laboratory Resources

|            |                 |
|------------|-----------------|
| Pots       | Vegetable seeds |
| Flats      | Soil test kit   |
| Soil media |                 |

#### Films, Videotapes, and Slides

The following is available from the Bureau of Audio Visual Instruction.

*Ruth Stout's Garden*. 00460 (16mm film, color, 23 minutes). Arthur Mokin, 1976.

*Tara's Mulch Garden*. 01532 (16mm film, color, 21 minutes). Wombat, 1976.

*What Plants Need to Grow*. 10114 (16mm film, color, 11 minutes). Encyclopaedia Britannica Educational Corporation, 1982.

The following are available from the Chevron Chemical Company.

*All About Tomatoes*. (16mm film, color, 25 minutes.) 1979.

*How to Grow a Vegetable Garden*. (16mm film, color, 20 minutes.)

*The Insect Challenge*. (16mm film, color, 22 minutes.) 1982.

*Small Space Gardens*. (16mm film, color, 20 minutes.)

The following is available from Film Comm.

*Battle of the Bugs*. (Color filmstrip with cassette, ten minutes.) 1977.

The following is available from Teaching Aids, Inc.

*Vegetable Gardening*. R-VT1026 (VHS videotape, color, 55 minutes).

The following is available from Vocational Agriculture Services.

*Vegetable Insect: Identification and Control*. F654.3 (80-frame filmstrip), G654.3 (Cassette tape with study guide).

The following are available from Vocational Education Productions.

*How to Design and Build a Vegetable Garden*. (Videotape.)

*How to Grow Warm-Weather Vegetables*. (Videotape.)

*How to Grow Cool-Weather Vegetables*. (Videotape.)

The following is available from Vocational Media Associates.

*Gardening Fundamentals*. (V018-93 (Five-filmstrip series with cassettes). Topics cover the basics of botany, planting, requirements for health, pruning, and propagation. Filmstrips also are available individually.

#### Equipment and Facilities

|                      |                         |
|----------------------|-------------------------|
| Small garden plot    | Plant trays             |
| Spade shovels        | Plant stand with lights |
| Propagating material |                         |

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## Ginseng (5-10 days)

This unit deals with the specialty crop of ginseng. Topics include career opportunities, plant description, marketing and demand, production costs, equipment and machinery identification, chemical and pest control, ginseng culture, planting and first-year establishment, maintenance during years two through four, harvest of roots, and problems with ginseng.

### Objectives

- To acquaint students with employment information and career opportunities in ginseng production
- To introduce students to the morphology of the ginseng plant
- To develop student understanding in the marketing of ginseng
- To acquaint students with equipment and practices involved in the production of ginseng
- To enhance student understanding of costs and problems associated with ginseng production

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the area of ginseng production and marketing—and relate it to their personal needs and aspirations;
- identify the various ginseng plant parts;
- identify and explain the impact of several factors affecting the ginseng market;
- list several criteria for evaluating the ginseng quality;
- calculate ginseng production costs;
- name and explain the purpose of implements used in ginseng production;
- choose appropriate chemical products and application methods for ginseng production;
- identify and explain major cultural practices used to grow ginseng from seed to maturity;
- list the different methods of harvesting ginseng; and
- outline several social and economic problems that ginseng producers encounter.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Description [Science]
  - Scientific classification
    - Panax quinquefolium*
  - Physical description

Plant and foliage  
Root identification

- Types of ginseng [Science]
  - Sam-Sam
  - Indonesian
  - Manchurian
  - Korean (red root)
  - American
    - Marathon County, Wisconsin
    - Kentucky
  - Canadian
  - Japanese
  - Wild root
- Markets and demand [Careers, Mathematics, Social Studies]
  - Ginseng uses
    - Medical
    - Herbal
    - Beverage
  - Places to market
    - Local
    - Export
    - Processed
  - Price determination from supply and demand levels
  - Marketing methods
    - Advertising
    - Bidding
    - Growers groups
  - Ginseng quality
    - Shape of roots
    - Cleanliness
    - Root texture
    - Root dryness
    - Root size
    - Root color
    - Root age
    - Type of ginseng
      - 1. wild
      - 2. domestic
  - Government controls
    - Licensing
    - Pesticide applications
- Ginseng production costs [Careers, Science, Social Studies]
  - Structures
    - Drying areas
    - Ginseng houses
  - Property taxes

- Income tax
- Labor
  - Wages
  - Benefits
- Chemicals
- Machinery
- Insurance
- Equipment
- Ginseng equipment and machinery identification [Science]
  - Tractor
  - Seeders
    - Hand
    - Spreader
    - Automatic multi-row
  - Drag-quackdigger
  - Sprayers
  - Drying equipment
    - Racks
    - Fans
    - Stoves
  - Straw shredder
  - Seed depulper
  - Diggers
  - Washers
  - Wagons
- Chemicals and pest control in ginseng [Science]
  - Chemical regulations
    - Private application and licensing
    - Commercial application and licensing
    - Safety
  - Insecticides
    - Chemical (manmade)
      1. Diazinon
      2. Sevin
      3. Malathion
    - Biological
      1. Dipel
      2. Thuricide
      3. Doom
      4. Permaquard fossil spray
    - Natural chemicals
      1. Rotonone
      2. Tyania
      3. Sabadilla
      4. Pyrethrins
  - Herbicides
    - Roundup

- Paraquat
- Fusilade
- Fungicides
  - Formeldehyde
  - Dexon
  - M-22, M-45
  - Clorex
  - Methyl Bromide
  - Captan
  - Vapam
  - Bravo
  - Vorley
- Rodenticides
  - Zinc phosphides
  - Warfarin
- Nematocides
  - Vydat
  - Others
- Hormones
  - Terr-O-Gel
  - Others
- Ginseng culture [Science]
  - Site selection
    - Soil types preferred
    - Drainage
    - Slope
  - Soil fertility requirements
    - Calcium
    - Phosphorus
    - Potassium
    - Nitrogen
    - pH
    - Lime
    - Minor nutrients
  - Light requirements
  - Temperature needs
- Planting and growing ginseng—first year [Science]
  - Seed selection
    - Green seed
    - Stratified seed
    - Fast stratified seed
  - Seedbed preparation
    - Plowing
    - Spraying
    - Debris removal
    - Dragging
    - Raising the bed



— Planting methods

— Mulching

Types

1. straw

2. sawdust

oak

poplar

cedar

3. leaves

Quality

Cost

Benefit

1. weed control

2. plant injury reductions

heaving

severe temperature

drying out

frost injury

• Maintenance—second year through the fourth year [Science]

— Spraying

Chemical products

Schedules

— Weeding and weed control

— Berry harvest and process

Pulp removal

Stratification

Stoning seed

Selling seed

• Root harvest [Science]

— Harvest methods

— Drying methods

— Storage methods

• Ginseng management [Science, Social Studies]

— Pests

Insects and related pests

1. lygus bug

2. root knot nematode

3. slugs

4. wire worms

5. cut worms

6. root mealy bugs

7. aphids

Controls

1. cultural

2. biological

3. chemical

- Rodent control
- Diseases
  - Types
    1. aternaria blight
    2. phytophthora cactorium
    3. pythium
    4. sclerotia
    5. fusaria
    6. others
  - Controls
    1. cultural
    2. biological
    3. chemical
- Theft
  - Storage protection systems
  - Garden protection systems
  - Government regulations
- Markets
- Environmental effects

### *Motivational Activities*

- Take a field trip to a ginseng garden.
- Tour the ginseng-producing area of Wisconsin in Marathon County.
- Attend Ginseng Days in Marathon County, Wisconsin.
- Provide samples of ginseng products, such as ginseng tea, to the class.
- Invite to the class a ginseng grower to explain how the crop is grown or a ginseng buyer to describe how it is marketed.

### *Learning Activities*

- Identify ginseng by quality.
- Start a ginseng plot.
- Collect plants that look similar to ginseng and that grow in the same type of soil.
- Collect and display labels from ginseng products.

### *Instructional Materials*

#### **Textbooks and References**

- The Complete Book of Ginseng* by Richard Heffern. Berkeley, CA: Celestial Arts Publishing, 1976.
- The Complete Ginseng Growers Manual* by David F. Curran. Hamburg, WI: D.F. Curran Productions, 1983.
- Ginseng* by Pamela Dixon. London, England: Duckworth, 1976.
- Ginseng: What It Is, What It Can Do For You* by Ben Harris. New Canaan, CT: Keats Publishing, 1978.
- Ginseng Culture in Marathon County* by Lene Polezinski. Stevens Point, WI: University of Wisconsin-Stevens Point, Thesis Publication, 1982. Available from Marathon County Public Library.
- The Ginseng Disease and Pest Reference Guide*. Hamburg, WI: D.F. Curran Productions, 1985.

*The Tao of Medicine: Ginseng, Oriental Remedies, and the Pharmacology of Harmony* by Stephen Fulder. Rochester, VT: Inner Traditions International, Ltd., 1987.

*The Truth about Ginseng*. San Diego, CA: A.S. Barnes, 1978.

*Woodland Nuggets of Gold: The Story of American Ginseng Cultivation* by Val Hardacre. Northville, MI: Holland House Press, 1974.

#### **Bulletins and Pamphlets**

The following is available from United States Government Printing Office.

*Growing Ginseng*. Farmers Bulletin Number 2201

#### **Periodicals**

*Curran's Ginseng Farmer*

#### **Computer Software**

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Plant*. Apple.

*Agri-ID: The Leaf*. Apple.

#### **On-line Computer Networks**

The following are available from the Ag Ed Network, AgriData Resources, Inc.

*Benefits of Chemical Use*. HS696.

*Integrated Pest Management*. HS629.

*Reading Chemical Container Labels*. HS697.

*Safe Use of Pesticides*. HS698.

#### **Laboratory Resources**

Hellige-Truog soil test kits

Ginseng plants, stems, berries, and root mounts

Soils testing laboratory

#### **Films, Videotapes, and Slides**

Slides on ginseng production; contact Tom Kaiser, Vocational Agriculture Department, Stratford High School, Stratford, WI 54486.

#### **Equipment and Facilities**

Computer

Greenhouse

Ginseng plot

## Greenhouse Management (45-90 days)

This unit deals with various aspects of greenhouse management. Topics include marketing and production of indoor and outdoor foliage plants, bedding plants, plants for food, potted flowers, and cut flowers. Additional topics cover plant material identification, greenhouse structures and equipment, common propagation methods, plant cultural requirements, and greenhouse management career opportunities.

### *Objectives*

- To acquaint students with employment information and career opportunities in the greenhouse industry
- To develop student understanding of the different types and components of greenhouses and other plant growing structures
- To introduce students to guidelines for effective greenhouse management and maintenance
- To increase student understanding of the morphology of common greenhouse plants
- To provide students with instruction and practice in identifying common greenhouse plants
- To develop student understanding of the principles and methods used to cultivate and propagate greenhouse plants
- To acquaint students with the various business aspects of greenhouse management, including recordkeeping, inventory management, scheduling and cost control, marketing, and customer service
- To investigate the feasibility of raising fish in the greenhouse
- To acquaint students with the art of topiary

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the greenhouse management industry—and relate it to their personal needs and aspirations;
- describe and provide examples of the different types and components of greenhouses and other plant growing structures;
- outline guidelines for effective greenhouse management and maintenance;
- identify common greenhouse plants;
- explain and demonstrate the methods used to cultivate greenhouse plants and outline the principles on which those methods are based;
- explain the principles and methods of propagating greenhouse plants;
- describe the various business aspects of greenhouse management, including recordkeeping, inventory management, scheduling and cost control, marketing, and customer service;
- determine the feasibility of raising fish in the greenhouse, and
- design and construct a topiary project.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Greenhouse structures and equipment
  - Functions of structures
  - Types of greenhouses
  - Other growing structures
  - Greenhouse construction materials
  - Heating greenhouses
  - Watering devices and humidity control
  - Ventilation
  - Light control
  - Temperature control and alarm systems
  - Bench materials and design
  - Maintenance of greenhouse
  - Greenhouse sizes and costs
  - Determining greenhouse locations
  - Systems for hydroponics
  - Tanks for aquaculture
- Plant material identification [Science]
  - Purpose
  - Terminology
  - Binomial system
  - Scientific nomenclature
  - Characteristics
  - Identification methods
- Greenhouse plant cultural requirements [Science]
  - Growing media types
  - Growing media characteristics
  - Soil or media sterilization
  - Water application
  - Fertilization
  - Soil sampling and testing
  - Light requirements and reflectivity
  - Temperature requirements
  - Humidity control
  - Air movement
  - Pest control and use of chemicals

- Propagation of common greenhouse plants [Science]
  - Propagation procedures
  - Sexual reproduction and advantages
  - Asexual reproduction, methods, and advantages
  - Internal plant structures
  - Root development and root types
  - Bud types
  - Stem types
  - Taking and preparing cuttings
  - Rooting cuttings successfully
  - Methods of layering
  - Plant division
  - Grafting
  - Budding
  - Plant growth regulators
- Outdoor foliage plant production [Science]
  - Foliage plant types
  - Foliage plant transfer
  - Plant location
  - Growth control
- Indoor foliage plant production [Science]
  - Foliage plant production
  - Morphological growth and environmental comparison
  - Houseplant seed germination
  - Fern spore cultivation
  - Pinching and pruning houseplants
  - Repotting houseplants
  - Low maintenance watering for home use
- Houseplant arrangements [Science]
  - Totem pole plant growth
  - Terrariums and bottle gardens
  - Dish gardens
  - Hanging baskets
  - Potted plant arrangements
  - Topiary
- Cut-flower production [Science]
  - Cut-flower industry development
  - Cut-flower display
  - Soil, water, and fertility needs
  - Flower structure types
    - Singles
    - Anemones
    - Pompons
    - Decorative
    - Incarved

- Reflexed
- Spider
- Flower growth patterns
  - Standard
  - Disbud
  - Disspray
  - Spray
- Calendar of production
- Cut-flower types
  - Chrysanthemums
  - Carnations
  - Roses
  - Snapdragons
  - Tulips
  - Others
- Cut-flower merchandising
- Potted flowers [Science]
  - Demand and sales
  - Azalea production
  - Begonia production
  - Geranium production
  - Poinsettia production
  - Easter lily production
  - Spring flowering bulb production
- Bedding plants [Science]
  - Development
  - Types
  - Season management
  - Seed sown
  - Plugs and mechanical propagation methods
  - Container design and selection
- Greenhouse vegetable production [Science]
  - Vegetable micropropagation
  - Greenhouse garden development
  - Hydroponic production
  - Specialty crop production
  - Commercial vegetable production
- Greenhouse fish production [Science]
  - Adaptable fish species
  - Environmental requirements
  - Infusion of fish feces into hydroponics system
- Greenhouse retail sales [Careers, Social Studies]
  - Product knowledge
  - Product competition

- Product cost analysis and pricing
- Displaying merchandise
- Advertising
- Plant sales and records
- Developing retail markets
- Marketing [Mathematics]
  - Analyzing the market
  - Sales strategy
  - Retail chain store markets
  - Direct sales markets
  - Secondary distribution markets
  - Open house sales
  - Labeling and pricing
  - Financial and inventory records
  - Billing statements, invoices, and purchase orders

### *Motivational Activities*

- Set up commission plant sales with students.
- Set up plant displays for various seasons.
- Build a cold frame from student designs.
- Take field trips to local greenhouses and university greenhouses.
- Visit homes with notable flower gardens.
- Invite greenhouse personnel, floral designers, and retail floral shop personnel to give class presentations.
- Participate in the state horticulture contest.

### *Learning Activities*

- Take part in a Supervised Agricultural Experience program.
- Compile career information using help wanted ads, information on advanced training in horticulture, and interviews of greenhouse employees.
- Organize or take part in a local foliage and flower show.
- Display materials for and specifications of greenhouse construction.
- List catalogued or live greenhouse plant species by common name or scientific name.
- Make a list of plant parts of herbaceous and woody greenhouse plants.
- Display various soil and growing media to illustrate differences in texture, porosity, and water holding capacity. Describe how the factors affect greenhouse plant development.
- List insects, weeds, and diseases on greenhouse crops and various control measures for each, including cost comparisons with different control methods.
- Demonstrate proper methods of watering plants, including how application frequency affects plant growth.
- Collect organic and inorganic fertilizers and test how plants react to different fertilization rates.
- Demonstrate the effects of proper, excess, and deficient light, temperature, humidity, and air on plant growth.
- Prepare a table showing all plants that can be propagated asexually.
- Prepare a table showing methods of asexual propagation including stem, leaf and root cuttings, air layering grafting, and budding.



- Display various types of growth regulators and the effect of each on different plants at different concentrations.
- Display chemical growth regulators and run tests with some of them, such as comparing gibberillic acid treated seeds to a control.
- Demonstrate the effects of forcing bulbs and use of shading to force flowering in greenhouse plants.
- Chart production costs for a crop of bedding plants or for geraniums using different pot spacings.
- Construct production schedules for plants grown in the greenhouse.
- Plan out the production schedules with the marketing strategy of seasonal and holiday demands in mind.
- Relate and chart marketing strategy to local competition, quality of merchandise, and economic conditions.
- Design and make hanging baskets or decorative houseplant arrangements.
- Assist a local greenhouse with seasonal activities such as transplanting.
- Manage spring bedding plant sales or plant annual flowers in decorative beds around school.
- Research and report on the most efficient method of raising fish in a greenhouse.
- Display various methods of fertilizing plants grown hydroponically, including using waste water from fish tanks.
- Complete the FFA agriscience application form.
- Design and assemble a topiary display.
- Construct a topiary display for the school.

### *Instructional Materials*

#### **Textbooks and References**

- The Ball Bedding Book: A Guide for Growing Bedding Plants* by George J. Ball. West Chicago, IL: George J. Ball, 1977.
- The Ball Red Book* by George J. Ball. Englewood Cliffs, NJ: Prentice Hall, 1985.
- Commercial Flower Forcing: The Fundamentals and Their Practical Application to the Culture of Greenhouse Crops* by Laurie Alexander et al. 8th ed. New York: McGraw-Hill, 1979.
- The Complete Greenhouse Book: Building and Using Greenhouses from Coldframes to Solar Structures* by Peter Clegg and Derry Watkins. Charlotte, VT: Garden Way Publishing, 1978.
- Crockett's Indoor Garden* by James U. Crockett. Boston, MA: Little, Brown, 1978.
- Greenhouse Flowers and Bedding Plants for Agribusiness Studies* by George S. Williams and Ronald L. Schumach. 2nd ed. Danville, IL: Interstate, 1983.
- Greenhouse Gardening*. Menlo Park, CA: Sunset Books/Lane Publishing, 1976.
- Greenhouse Management for Flower and Plant Production* by Kennard S. Nelson. 2nd ed. Danville, IL: Interstate, 1980.
- Greenhouse Operation and Management* by Paul V. Nelson. 3rd ed. Reston, VA: Reston Publishing, 1985.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Care and Sharpening of Lawn and Garden Tools*. A2683.
- Care of House Plants*. NCR99.
- Container Gardening*. A3382.
- Evaluating and Judging Flowers and Indoor Plants*. A2935.

*Flowering Potted Plants.* A1596.

*Garden Fertilization.* A2304.

*Geranium (Pelargonium spp.) Disorder: Bacterial Stem Rot and Leaf Spot.* A2559.

*Gladiolus (Gladiolus hortulanus) and Related Plants Disorder: Stromatinia Disease, Dry Rot, Neck Rot.* A2759.

*How to Grow Tuberous-Rooted Begonias and Gloxinias.* A1573.

*Major Problems of Poinsettia Culture.* NCR173.

*Young Greenhouse, Bedding, Garden, and Landscape Plants Disorder: Damping Off.* A2700.

## **Periodicals**

*Greenhouse Grower*

*Grower*

*Interior Landscape Industry*

## **Computer Software**

The following is available from Hobar Publications.

*Horticulture and Related Review.* Apple, IBM, TRS, Macintosh.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Annuals I.* Apple, IBM.

*Micro-Tutor: Annuals II.* Apple, IBM.

The following is available from Vocational Education Productions.

*Ortho's Computerized Gardening.* Apple, IBM.

## **Laboratory Resources**

The following is available from Animal Creations, Living Plant Sculpture and Topiary Craft Sculpture.

*Topiary Kits*

The following is available from the Pennsylvania Instructional Materials Services.

*Greenhouse Crop Production.* 1971.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Bedding Plant Production.* 2208L (Task sheets). 1981.

*The Greenhouse Worker—Student Manual.* 9502M. 1981.

## Films, Videotapes, and Slides

The following are available from Nasco.

*Greenhouse Maintenance.* C11989N (Color filmstrip with cassette and script).

*Plant Identification: Annuals, Perennials, Houseplants.* C10435N (78-frame color filmstrip with cassette and script.)

*Propagating Ornamental plants.* C10429N (Color filmstrip with cassette and script).

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Foliage Plants.* 2009S (172 color slides with script). 1983.

*Greenhouses and Related Structures.* 2001S (66 color slides with script). 1982.

*How to Grow Plants in a Greenhouse.* 251X (VHS videotape, color, 47 minutes). Kartes Video Communications.

The following are available from Teaching Aids, Inc.

*Annuals/Hanging Baskets.* R-VT1028 (VHS videotape, color, 38 minutes).

*Indoor Plants.* R-VT1081 (VHS videotape, color).

The following are available from Vocational Agriculture Services.

*Greenhouses—Uses and Design.* F680 (44-frame filmstrip).

*Planting and Care of Hanging Baskets.* F613 (66-frame filmstrip).

*Propagation of Evergreens.* F685-1 (53-frame filmstrip).

The following is available from Vocational Education Productions.

*The Horticulture Enterprise Series.* 1-204-230H (Four color filmstrips with cassettes and scripts).

## Equipment and Facilities

Plant growth structures

Greenhouses

Plant growth chamber

Portable water tube greenhouse

Plant grow lights

Heating units

Watering equipment

Automatic system

Manual system

Benches

Potting benches

Propagating benches

Plant benches

Ventilation systems

Shade control materials

Soil storage containers

Soil sterilizer

Low-volume sprayer or fogger

Supplemental lights

Plastic pots (various sizes)

Hanging baskets

Other plant containers

Terrariums

Dish gardens

Decorative containers and materials

Germination flats

Floral refrigerator

Cold frame

Trimming and pruning shears

Hand shovels

Grafting knives

Heat-control devices

Shovel

## Groundwater Quality and Management (10-30 days)

This unit deals with the factors involved in groundwater quality and management. Topics include the study of the hydrologic cycle, Wisconsin aquifers, possible contaminants through various land uses, and problem resolution and management. Careers and career opportunities are an integral part of the course.

### *Objectives*

- To acquaint students with employment information and career opportunities in the groundwater quality and management industry
- To develop student understanding of the dynamics of water movement and groundwater recharge
- To illustrate the relationship of the hydrologic cycle to groundwater resources in Wisconsin
- To emphasize the value of groundwater as a natural resource
- To help students identify potential threats to groundwater quality
- To facilitate student inquiry into strategies and methods for maintaining groundwater quality
- To acquaint students with the nature and extent of government intervention into the groundwater management area

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the area of groundwater quality and management—and relate it to their personal needs and aspirations;
- define and describe the hydrologic cycle;
- describe the four Wisconsin aquifers;
- identify several uses of groundwater;
- identify many natural chemical characteristics of groundwater;
- describe the impact of land use on water quality;
- identify many health concerns related to groundwater pollution;
- describe methods of resolving groundwater problems;
- explain the government's role in maintaining quality groundwater;
- analyze agricultural contributions to water problems and offer solutions to them;
- be familiar with agencies that work with water quality management;
- properly take water samples; and
- perform tests on water samples.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- Groundwater resource [Science]
  - Hydrologic (water) cycle
  - Groundwater recharge and movement
  - Aquifer types
  - Natural chemical characteristics
- Groundwater use
  - Municipal water supplies
  - Private water supplies
  - Industrial use
  - Agricultural use
- Water quality measures [Science]
  - Coliform index—human sewage
  - Dissolved oxygen (DO)
  - Biochemical oxygen demand (BOD)
  - Phosphates
- Land use and impact on water quality [Social Studies]
  - Residential development
    - Septic systems
    - Household hazardous wastes
    - Home lawns and gardens
  - Agricultural activities
    - Fertilizers
    - Pesticides
    - Animal waste storage
  - Industrial activities
    - Volatile organic compounds
    - Industrial disposal
  - Underground storage tanks
  - Landfills and dumps
  - Mining
  - Wastewater and sludge disposal
  - Bulk storage
- Health concerns [Social Studies]
  - Nitrates
    - Sources
    - Health impacts
  - Bacteria
    - Sources
    - Health impacts
  - Pesticides, volatile organic compounds, petroleum
    - Sources
    - Health impacts

- Problem resolution
  - Home well monitoring
  - Eliminating sources of contamination
  - Well depth and location
  - Home water treatment
- State regulatory framework for groundwater management
  - Wisconsin Groundwater Bill
    - Groundwater standards
    - Well compensation
    - Groundwater monitoring
    - Laboratory certification
    - Environmental repair fund
  - State agency responsibilities
    - Department of Natural Resources (DNR)
    - Department of Agriculture, Trade and Consumer Protection (DATCP)
    - Department of Health and Social Services (DHSS)
  - Local regulatory options
    - Education/information
    - Septic ordinances
    - Well codes
    - Zoning
      1. restricting uses
      2. restricting areas

### *Motivational Activities*

- Take field trips to sites such as
  - a municipal or county landfill;
  - a municipal water-treatment plant;
  - a well-drilling site;
  - a private water-testing laboratory;
  - beverage- or food-processing industries;
  - water resource sites, including springs, streams, lakes, and wetlands; and
  - rock exposures that show the effects of groundwater.
- Invite resource people, such as the following, to give class presentations:
  - water chemist
  - well-drilling contractors, pump dealers, or plumbers
  - environmental specialists
  - hydrologists, hydrogeologists, and engineers
- View films, videotapes, and slides on topics related to this unit.
- Post bulletin board displays on groundwater movement.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Design a bulletin board display on the various topics relating to groundwater.
- Research and report on how water resources have influenced the history of the community.

- Interview resource people regarding water quality and the needs of various manufacturing and industrial operations and give a report to the class.
- Do a water-use audit for your home or farm, and then develop a plan to conserve water.
- Collect or develop cartoons that address various issues related to groundwater.
- Collect and test water samples to determine suitability for drinking.
- Research how different types of wells are constructed and give a report on it.
- Develop a survey that assesses the community's awareness and attitudes toward groundwater.
- Organize or take part in a class contest for a speech, essay, or poster about groundwater.
- Compile a list of hazardous wastes in your home, such as pesticides, paints, and solvents.
- Discuss the various pollutants in the groundwater and their tolerable levels.
- Discuss local groundwater problems and determine who is at fault, who should pay, and how problems can be prevented.
- Construct a groundwater flow model.
- Construct a model of a conventional or mound septic system.

### *Instructional Materials*

#### **Textbooks and References**

- Elementary Soil and Water Engineering* by Glenn O. Schwab and Richard K. Frevert. 3rd ed. New York: John Wiley and Sons, 1985. Available from National Farm Book Company.
- Planning for an Individual Water System*. 4th ed. Athens, GA: American Association for Vocational Instructional Materials, 1982.
- Soil and Water Conservation* by Frederick R. Troeh et al. Englewood Cliffs, NJ: Prentice Hall, 1980. Available from National Farm Book Company.
- Water Quality and Its Control* by J.C. Lamb. New York: John Wiley and Sons, 1985.

#### **Bulletins and Pamphlets**

The following is available from the American Chemical Society.

*Chemical Risk: A Primer*. 1984.

The following are available from the Cooperative Extension Service.

- Aldicarb and Wisconsin's Groundwater*. G3218.
- Drinking Water Contamination: Understanding the Risks*. G3339.
- How Drinking Water Standards Are Established*. G3338.
- Improving Your Drinking Water Quality*. G3378.
- Land Use and Groundwater Quality in the Central Wisconsin Sand and Gravel Aquifer*. G3335.
- Maintaining Your Home Well Water System*. G3399.
- Pesticides in Groundwater: How They Get There; What Happens to Them; How to Keep Them Out*. G3213.
- Viruses and On-Site Wastewater Treatment*. R2740.
- Wisconsin's Groundwater: An Invaluable Resource*. G2651.



The following are available from the National Water Well Association.

*America's Priceless Groundwater Resource.* 1977.  
*Before You Hire a "Water Witch."* 1978.  
*Domestic Water Treatment for Homeowners.* 1982.  
*Everything You Wanted to Know About Septic Tanks.*  
*Groundwater Heat Pumps.*  
*Groundwater Pollution Control.*  
*Water Conservation in Your Home.*

The following are available from the Wisconsin DNR.

*Acid Rain.* AM-015.  
*Bacteriological Contamination of Drinking Water.* 2-3300.  
*Groundwater Study Guide.* 19-8500.  
*Groundwater—Wisconsin's Buried Treasure.* Supplement to *Wisconsin Natural Resources* magazine.  
*Nitrate in Drinking Water.* WS-001.  
*You and Your Well.*

#### Periodicals

*Environmental Pollution*  
*Soil and Water Conservation News*  
*Water Pollution Control Federation Journal*  
*Water Resources Research*

#### Computer Software

The following is available from the Central Wisconsin Groundwater Center.

*Gerbil.* IBM.

The following is available from NAGT-Computer.

*NAGT Special Publication No. 1.*

#### Laboratory Resources

Groundwater flow model. (Available from the University of Wisconsin-Stevens Point.)  
Water test kits

#### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Groundwater.* 10509 (VHS videotape, color, 18 minutes) or 07894 (16mm film, color, 19 minutes).  
Encyclopaedia Britannica Educational Corporation, 1982.  
*Wisconsin's Groundwater.* 11375 (VHS videotape, color, 25 minutes) or 09945 (16mm film, color, 26 minutes). University of Wisconsin, Department of Agricultural Journalism, 1982, 1984.



The following are available from the University of Wisconsin-La Crosse Film Rental Library.

*Water*. 2X420/C (16mm film, color, 13 minutes). Journal Films, 1981.

*Water: A Precious Resource*. 6B827/F (16mm film, color, 23 minutes). National Geographic Society, 1979.

*The Water Cycle*. 4P750/C (16mm film, color, 14 minutes). Encyclopaedia Britannica Educational Corporation, 1980.

*Water for All Living Things*. 2B209/B (16mm film, color, nine minutes). Educational Horizons.

#### **Equipment and Facilities**

The following is available from the Bureau of Water Resources Management, Wisconsin DNR.

*Groundwater and Land Use in the Water Cycle*.

## Horse Science (15-30 days)

This unit deals with horse science in Wisconsin. Topics include career opportunities, breeds, tack and equipment, safe handling procedures, horse health maintenance, nutrition, reproduction, and judging techniques.

### *Objectives*

- To acquaint students with employment information and career opportunities in the horse industry
- To review the history of the horse and the horse industry
- To develop student understanding of the uses and functions of horses
- To increase student ability to perform routine stable management practices
- To provide students with instruction in the proper use of basic horse terminology
- To acquaint students with the basics of equine anatomy
- To provide students with training in the judging of various halter and equitation classes
- To familiarize students with the use and care of horse equipment
- To increase student understanding of basic training practices for horses at halter or under saddle
- To acquaint students with expenses of owning a horse

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the horse industry—and relate it to their personal needs and aspirations;
- understand and appreciate the uses of horses;
- perform stable management practices such as recordkeeping, grooming, feeding, and parasite control;
- identify horse color and markings and other physical characteristics for registration purposes;
- define horse anatomy and industry terminology;
- judge halter and equestrian classes;
- list various types, correct use, and proper care of horse equipment;
- perform basic training practices for horses at halter or under saddle;
- estimate the cost of owning and stabling a horse;
- understand the history of the horse industry by noting the original species and modern breeds;
- explain the breeding systems and practices associated with horse reproduction management; and
- understand the digestive system of a horse and formulate rations accordingly.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- History [Science]
  - Origins
  - Modern breeds
- Horse anatomy [Science]
  - Parts identification
  - Bone structure
  - Reproductive tracts
- Breeds and uses
  - Light horses
    - Ponies (less than 56 inches tall)
    - Horses (more than 56 inches tall)
  - Draft horses, mules, and donkeys
- Reproduction [Science]
  - Genetics
  - Breeding system
  - Mating procedures
  - Artificial insemination
  - Parturition
  - Mare and foal maintenance
- Horse judging
  - Age and height
  - Unsoundness and blemishes
  - Performance
    - Hunter classes
    - Western pleasure classes
    - English pleasure classes
- Nutrition
  - Digestive system
  - Feedstuff composition
  - Rations formulation
- Stable Management
  - Safe handling practices
  - Grooming
  - Hoof care and farrier use
  - Disease and parasite control
    - Types and symptoms
    - Cause, prevention, and treatments
  - Buildings and equipment
    - Cost
    - Maintenance

- Proper type and care of tack
  - Recordkeeping
  - Ownership costs

### *Motivational Activities*

- Take field trips to local stables.
- Invite resource people, such as the following, to give class presentations:
  - owner or manager of a stable or horse farm
  - large-animal veterinarian
  - horse trainer
  - farrier
- View films, videotapes, and slides on horse breeds.
- Take a field trip to a horse show.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program related to the horse industry.
- Compute the annual cost of owning a horse.
- Research a breed of your choice and give a report on it.
- Demonstrate how to ride or groom a horse, the proper care of tack, or judging techniques.

### *Instructional Materials*

#### **Textbooks and References**

- Bit by Bit: A Guide to Equine Bits* by Diana R. Tuke. 2nd ed. New York: Arco Publishing, 1978.
- Careers for Horse Lovers* by Ronald Trahan. Boston: Houghton Mifflin, 1981.
- Centered Riding* by Sally Swift. New York: St. Martin's Press, 1985.
- Feeding and Care of the Horse* by Lon D. Lewis. Philadelphia: Lea & Febiger, 1982.
- Horse Identifier: A Field Guide to Horse Breeds*. New York: Sterling Publishing, 1980.
- Horse Nutrition: A Practical Guide* by Harold F. Hintz. New York: Arco Publishing, 1983.
- Horses: A Guide to Selection, Care and Enjoyment* by Warren J. Evans. New York: W.H. Freeman, 1981.
- Horses in Health and Disease* by James L. Naviaux. 2nd ed. Philadelphia: Lea & Febiger, 1985.
- Trails Directory: Horseman's Guide to Wisconsin's Trails*. 3rd ed. Madison, WI: Wisconsin State Horse Council, 1985.
- Veterinary Notes for Horse Owners* by Horace N. Hayes. New York: Prentice Hall, 1987.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Alfalfa—the High Quality Hay for Horses*. A3207.
- Forages for Horses*. A2460.
- Horse Conformation*. A3224.
- Horse Safety*. A2185.
- Internal Parasites of Horses*. A2505.
- Winter Horse Care*. A2149.

The following are available from the Equus Monograph Series, Fleet Street Corporation.

*Feeding for Performance.* 21700.

*Foal Care and Training.* 16500.

*The Hoof.* 16700.

*Pinpointing Lameness.* 21600.

*Skin Troubles and Remedies.* 21800.

### Periodicals

*The Draft Horse Journal*

*Equus*

*Horse and Rider*

*Modern Horse Breeding*

*Practical Horseman*

*The Western Horseman*

### Computer Software

The following is available from A and T Equine Center.

*Horse Management*

The following is available from ACS Software Publishing.

*Equine Nutritional Software*

The following is available from ARK Software, Inc.

*Horseman*

The following is available from Equine Management Services.

*Ranger*

The following is available from Hobar Publications.

*Horses, Horsemanship, and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Horse.* Apple, IBM.

*Agri-Quiz: Horses.* Apple, IBM.

## Laboratory Resources

The following are available from the Fleet Street Corporation.

*Deworming Wheel.* 02888.  
*Equus Foaling Chart.* 2600.  
*Equus Stable Pharmacy Chart.* 29000.  
*Medicine Wheel.* 19100.  
*Nutrition Wheel.* 700.

The following is available from Interstate Printers and Publishers, Inc.

*Horsemanship Equipment Identification and Study Kit.* (139 cards and teacher's key).

The following are available from Nasco.

*A Guide to Horses C7920N* (Wall chart).  
*Sam Savitt Draft Horse Chart.* C11784N.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Horse Management Task Sheets.* 461X. 1983.

## Films, Videotapes, and Slides

The following are available from the American Quarter Horse Association.

*The Horse America Made.* (16mm film.)  
*Judging Western Riding.* (VHS videotape.)  
*On the Fifth Day.* (16mm film, color, 30 minutes.)  
*The Reining Horse.* (16mm film, color, 27 minutes.)  
*Showmanship.* (16mm film, color, 30 minutes.) 1979.  
*Survival of the Fittest.* (16mm film, color, 48 minutes.) 1978.

The following are available from Hobar Publications.

*Equestrian.* H-VV-4 (VHS videotape, 60 minutes).  
*Grooming Your Horse.* H-VT1068 (VHS videotape, 60 minutes).  
*Leading Your Horse.* H-VT1068 (VHS videotape, 60 minutes).  
*Preparing the Halter Horse for Show.* H-VT1069. (VHS videotape, 60 minutes).

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Basic Horse Care.* 422XX (VHS videotape, color, 80 minutes). Farnam Videos, 1987.  
*Breeds of Light Horses.* 422X (49 slides with script). 1985.  
*Horse Judging Contest.* 485X (61 color slides with script). 1987.  
*Safe Horse Trailering.* 481X (77 color slides with script). 1980.

The following are available from Vocational Education Productions.

*Basic Horsemanship, Volume I: From the Ground Up.* 6-035-103H (VHS videotape, color, 60 minutes).

*Basic Horsemanship, Volume II: Health Care.* 6-035-104H (VHS videotape, color, 60 minutes).

*Basic Horsemanship, Volume III: Mount Up.* 6-035-105H (VHS videotape, color, 60 minutes).

*The Horse Judging Kit.* 1-466-200H (30 color slides with cassette and guide).

*Imprint Training the Foal.* 6-035-102H (VHS videotape, color).

*The Jeffery Method of Horse Handling.* 6-031-100H (VHS videotape, color, 75 minutes).

### **Equipment and Facilities**

Saddles

Bridles

Bits

Horseshoes and nails

Farrier's tools (clincher, tester, etc.)

Grooming tools (curry comb, brush, twitch, etc.)

Feed samples

Small scales for weighing samples

Calculators



## Horticultural Science (60-90 days)

This unit deals with horticulture science. Topics include horticulture career opportunities, the horticulture industry, horticulture plant growth, environmental control factors, horticultural structures, identification and control of plant disorders, identification and control of plant pests, fruit production, horticulture business management, and employment in horticulture.

### *Objectives*

- To acquaint students with employment information and career opportunities in the horticulture industry
- To develop student understanding of the extent, nature, and history of the horticulture industry
- To develop student appreciation of the impact of the horticulture industry on Wisconsin's economy
- To develop student understanding of the types and uses of tools, equipment, containers, and plant materials common to the various fields of horticulture
- To provide students with information on how to procure and properly care for horticultural plant materials
- To provide students with instruction in identifying the important plants used in the United States' horticulture industry
- To assist students in selecting and preparing appropriate growth media for the production of various plant materials
- To provide students with guidelines for the effective use of fertilizers in horticultural production
- To enhance student ability to assess and provide for the water needs of various horticultural plant materials
- To develop student understanding of how to prevent, diagnose, and treat common disease, weed, and insect infestations in horticultural crops
- To acquaint students with the planting and cultivation of various fruit and vegetable crops
- To provide students with instruction in how to prepare accurate bills, invoices, and inventories
- To acquaint students with the art of topiary.

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the horticulture industry—and relate it to their personal needs and aspirations;
- identify and explain the differences, advantages, and disadvantages of different types of horticulture and what is involved in each;
- differentiate between operations of wholesale and retail horticultural businesses;
- relate the importance of each major horticultural industry to the economy in the state of Wisconsin;
- discuss the horticultural development and improvement of the horticultural industries as they relate to our present state;
- identify different types of containers, plant materials, tools, and care procedures used on various occasions within each major field of horticulture;



- identify the common horticultural plants;
- identify and explain advantages and disadvantages of various growth media for production of different plant materials used in each horticultural industry;
- explain the difference between a complete and an incomplete fertilizer;
- explain the factors that will determine water usage and consumption by plant materials;
- identify and explain different types and methods of irrigation used in the various horticultural fields for plant production;
- identify major diseases that effect the plants used in each of our horticultural fields;
- identify major insect pests that effect the plants used in each of our horticultural fields;
- develop a written plan for seedbed preparation, planting, and cultivation of selected fruit and vegetable crops;
- gather information related to billing customers and be able to accurately calculate bills, invoices, and inventories; and
- design and construct a topiary project.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- The horticulture industry
  - Definition
  - Related plant sciences
  - Importance of horticulture
  - Branches of horticulture
  - Influence of climatic conditions
- Horticulture plant growth [Science]
  - Plant parts and functions
  - Stems
  - Leaves
  - Buds
  - Flowers
  - Fruits
  - Root systems
  - Cell structure
  - Plant growth and development
    - Photosynthesis, respiration, transpiration, and translocation
    - Environmental factors
    - Plant growth processes
  - Horticulture plant identification
    - Importance
    - Plant characteristics
    - Life cycle

- Environmental control factors [Science]
  - Soil and other media
    - Physical characteristics of soil
    - Importance
    - Soil-water relationships
    - Soil mulches
    - Soil organisms effects and control
    - Soil tilth
    - Media culture for growing plants
  - Inorganic media and mixtures
- Moisture, light, temperature, and air [Science]
  - Importance of water
  - Effect of light quantity, quality, and duration
  - Temperature effect
  - Oxygen and carbon dioxide effects
- Propagation [Science]
  - Sexual and asexual plant reproduction
  - Seed growth
  - Asexual propagation
    - Cuttings
    - Layerage
    - Budding and graftings
    - Specialized structures
- Horticulture plant operations
  - Transplanting a tree or shrub
  - Balling and burlapping a tree or shrub
  - Container grown plant transplantation
  - Guying and staking a tree
  - Pricking off transplants
  - Repotting plants
- Terrariums
  - Containers
  - Planting preparation
  - Plants selection
  - Planting
  - Media design
  - Terrarium care
- Plant disorder identification and control [Science]
  - Healthy plant characteristics
  - Plant disorder symptoms
  - Plant disorder diagnosis
  - Plant physical damage
  - Plant disorder prevention
  - Plant management plan

- Plant pest identification and control [Science]
  - Plant pest symptoms
  - Common plant pests
  - Insect control methods
  - Insect life cycles
- Identifying and controlling plant diseases [Science]
  - Plant disease symptoms
  - Plant disease causes
  - Plant disease origins
  - Plant disease control
- Pesticide safety [Science]
  - Pesticide identification
  - Interpret pesticide labels
  - Safe pesticide applications
- Horticultural structures
  - Common horticultural structures and equipment
  - Types of horticultural structures
    - Greenhouses
    - Hotbeds
    - Cold frames
    - Wintering houses
    - Shade houses
  - Types of greenhouses
  - Material construction for greenhouses
  - Heating and cooling greenhouses
- Fruit production
  - Tree fruits
  - Small fruits
- Horticultural business management [Social Studies]
  - Market research
  - Financial plan
  - Organization
  - Roles and responsibilities
  - Records

### *Motivational Activities*

- Take a field trip to a local greenhouse or other horticultural business.
- Invite a horticulture industry employee to speak to the class.
- Attend a horticulture industry trade show.
- Post bulletin board display of horticulture careers.
- Hold a panel discussion of the importance of horticulture in our lives.
- Plan laboratory exercises related to plant growth.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect and identify the different types of flowers and their parts.
- Conduct experiments of osmosis and diffusion.
- Experiment with germinating seeds and the condition needs—list conditions and specific circumstances.
- Take cuttings from plants incorporating the use of rooting hormones.
- Start plants from seed.
- Conduct experiments in tissue culture using aseptic conditions.
- Classify plants grown in the community.
- Transplant seedlings.
- Identify different vegetables and varieties grown in your area.
- Test soils for acidity and nutrient content.
- Identify insects that are common in your production area and tell how each can be controlled.
- Identify potted plants, foliage plants, and greens.
- Sterilize growing media by means of both chemical and heat.
- Identify physical examples of organic and inorganic fertilizers.
- Identify samples of common growing media.
- Determine common botanical names of plants commonly found in the greenhouse.
- Plant a container-grown plant.
- Plant a bare root plant.
- Determine the amount of fertilizer needed for various types and sizes of trees.
- Make a batch of growing media.
- Repot a plant.
- Demonstrate proper methods of watering plants.
- Write a report on plant propagation.
- List materials used in greenhouse production.
- Construct a topiary display for the school.

## *Instructional Materials*

### **Textbooks and References**

*Ball Red Book* by George J. Ball. 14th ed. Englewood Cliffs, NJ: Prentice Hall, 1985.

*Fundamentals of Horticulture* by J.B. Edmond et al. 4th ed. New York: McGraw-Hill, 1975.

*Horticultural Science* by Jules Janick. 4th ed. New York: W.H. Freeman, 1986.

*Horticulture: A Basic Awareness* by Robert F. Baudendistel. 2nd ed. Reston, VA: Reston Publishing, 1982.

*Horticulture: Principles and Practical Applications* by R. Poincelot. Englewood Cliffs, NJ: Prentice Hall, 1980.

*Introductory Horticulture* by Edward Reiley and Carroll L. Shry. 2nd ed. Albany, NY: Delmar, 1988.

*Ornamental Horticulture: Principles and Practices* by Joebs E. Ingels. Albany, NY: Delmar, 1985.

*Working in Horticulture*. New York: McGraw-Hill, 1980.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Care of House Plants.* NCR99.  
*Houseplant Problems.* A8MI1077.  
*How to Grow African Violets.* A1483.  
*Terrariums and Dish Gardens.* A2900.  
*Success with Peonies.* A1568.

### **Periodicals**

*American Society for Horticultural Science Journal*  
*Hortscience*  
*Horticulture*  
*Minnesota Horticulturalist*

### **Computer Software**

The following is available from Hobar Publications.

*Horticulture and Related Review.* Apple, IBM.

The following are available from the Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Basic Horticulture I.* Apple, IBM.  
*Micro-Tutor: Basic Horticulture II.* Apple, IBM.  
*Micro-Tutor: Horticulture Insects and Diseases.* Apple.  
*Micro-Tutor: Math for Horticulture.* Apple.

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Benefits of Chemical Use.* HS696.  
*Pesticide Movement and Misuse.* HS699.  
*Reading Chemical Container Labels.* HS697.  
*Save Use of Pesticides.* HS698.

### **Laboratory Resources**

The following is available from Animal Creations, Living Plant Sculpture and Topiary Craft Sculpture.

*Topiary Kits*

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Plant Propagation Task Sheets.* 2204L. 1978.

## Films, Videotapes, and Slides

The following are available from Nasco.

*Care of Flowering House Plants.* C10556N (82-frame color filmstrip).

*Plant Identification: Annuals, Perennials, Houseplants.* C10435N (78-frame color filmstrip with cassette and script).

*Plant Tissue Color Charts.* C12971N (17 charts with loose-leaf binder, instructions, and masks). 2nd ed., 1977.

*Terrariums and How to Make Them.* C10434 (60-frame color filmstrip with cassette and script).

The following are available from Vocational Agriculture Services.

*Selecting and Handling Pesticides.* F1108-1.2 (62-frame color filmstrip with study guide). 1978.

*Understanding and Safe Use of Pesticides.* F1101-1.1 (72-frame color filmstrip with study guide). 1978.

The following is available from Vocational Education Productions.

*Plant Propagation.* 6-044-101H (Volume I, VHS videotape, 22 minutes) and 6-044-101H (Volume II, VHS videotape, 21 minutes).

## Equipment and Facilities

Plant growing area

Plant stands

Soil

Various plant types

Pots, flats, or other growing containers

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## Human Relations (5-15 days)

This unit deals with human relations in agriculture and agribusiness. Topics include career opportunities, terms and concepts, personality, interrelationship guidelines, employer and employee perspectives, union history, and supervisory positions.

### *Objectives*

- To acquaint students with employment information and career opportunities in the human relations aspect of agriculture and agribusiness
- To familiarize students with basic human relations terms and concepts
- To facilitate student inquiry into personality traits desired by various employees
- To assist students in reflecting on how they are seen by others
- To acquaint students with guidelines for developing effective working relationships with co-workers
- To develop student understanding of how employees view and evaluate job candidates
- To assist students in identifying how employers view and evaluate employees
- To increase student understanding of the history, role, and functions of unions in agriculture
- To develop greater student understanding of the duties and responsibilities of lead workers, supervisors, and managers

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the human relations aspect of agriculture and agribusiness—and relate it to their personal needs and aspirations;
- understand and apply basic human relations concepts and terms;
- identify personality traits desired by various employers;
- interpret how others view the student through reflections and responses;
- apply the guidelines for developing effective working relationships in agricultural occupations;
- list and understand what employers are looking for in job candidates;
- discuss employee attitude and evaluation of employers in agriculture;
- identify historical background, roles, and functions of unions in agriculture; and
- list the duties and responsibilities of lead workers, supervisors, and managers.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Terms and concepts
- Personality and traits [Careers, Social Studies]
  - Self-examination
    - Grooming, posture, and proper dress
    - Voice and speech
    - Listening skills
    - Physical activity
    - Emotional activity
    - Lifestyle and values
  - Traits
    - Attitude
    - Courtesy
    - Dependability
    - Desire to succeed
    - Enthusiasm
    - Foresight
    - Friendliness
    - Health
    - Honesty
    - Initiative
    - Loyalty
    - Morality
    - Neatness
    - Open-mindedness
    - Personal appearance
    - Punctuality
    - Sense of humor
    - Self-control
    - Tact
    - Speaking ability
  - Personality enhancers
    - Treat people as individuals
    - Recognize that human behavior is unpredictable
    - Don't pass the buck
    - Be loyal to others
    - Seek raises and promotions on merit
    - Compliment fellow workers
    - Look sharp
    - Plan ahead
    - Be friendly
    - Don't be afraid to ask questions
    - Approach your job with enthusiasm
    - Resist cliques
- Coworker guidelines [Careers, Social Studies]
  - Respect for authority
  - Cooperation
  - Honesty



- Responsibility
- Loyalty
- Interest in others
- Understanding customers
- Cheerfulness
- Employer personal expectations [Careers]
  - Positive elements
    - Enthusiasm
    - Friendliness
    - Personal appearance
    - Background research or knowledge of employer
    - Punctuality
    - Initiative
  - Negative elements
    - Poorly groomed
    - Uneasy or fidgety
    - Poor eye contact
    - Discourteous
    - Poorly motivated
    - Poor self-concept
- Employee expectations [Careers]
  - Positive elements
    - Honesty
    - Cooperation
    - Information
    - Constructive criticism
    - Cheerfulness and sense of humor
    - Fairness and equity
  - Negative elements
    - Condescendence
    - Unloyal
    - Unfriendly
    - Tactless or destructive evaluation
    - Untrustworthy
    - Unfair or inequitable in reward and discipline
- Unions and functions [Social Studies]
  - Rules and bylaws
    - Membership fees
    - Local rules
    - Pay scales
  - Functions
    - Collective bargaining
    - Negotiating, mediating, and arbitrating
    - Picketing and striking
    - Unemployment compensation
    - Job security and pensions

- Supervisor and manager characteristics [Careers, Social Studies]

- Education

- Vocational or associate degrees

- Bachelor degrees

- Workshops or special training

- Work experience or tenure

- Duties

- Quality control

- Delegate responsibility

- Liaison between workers and upper management

- Filing reports

- Conduct department operations

### *Motivational Activities*

- Take field trips to agribusiness firms.
- Invite resource people to give class presentations.
- View films, slides, and filmstrips on topics related to this unit.
- Invite former students to report on their employment experiences.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Complete an aptitude inventory, an interest inventory, and a personality inventory.
- Participate in interviews with various personnel.
- Review union and professional organization literature to determine its organizational structure.
- Compile a list of union and professional organizations available to employees in the area.
- Write a letter of resignation.

### *Instructional Materials*

#### **Textbooks and References**

- Careers in Agribusiness and Industry* by Archie A. Stone et al. 3rd ed. Danville, IL: Interstate, 1980.
- Communication Strategies: A Guide for Agricultural Change Agents* by Herbert F. Lionberger and Paul Gwin. Danville, IL: Interstate, 1982.
- Directory of Communicators in Agriculture*. Chicago: Agricultural Relations Council, n.d.
- Dictionary of Occupational Titles*. 5th ed. Washington D.C.: United States Department of Labor, printed annually.
- Encyclopedia of Careers and Vocational Guidance* by William E. Hopke. 6th ed. 3 vols. New York: Doubleday, 1984.
- Exploring Agribusiness* by Ewell P. Roy. Danville, IL: Interstate, 1980.
- Instant Personal Problem Solving* by Albert C. Gubitz. Danville, IL: Interstate, 1984.
- Personal Information Book* by Louis Marucci. Danville, IL: Interstate, 1975.
- Teaching Vocational Agriculture/Agribusiness* by Harold R. Binkley and Rodney W. Tulloch. Danville, IL: Interstate, 1981.

## **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Look Before You Leap.* B2707.  
*Managing Farm Stress.* B2744-1.  
*Understanding You.* B3089.

The following is available from the National FFA Supply Service.

*FFA Leadership and Personal Development Series.* LPD.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Agribusiness, Is It for Me?* 9003B. 1975.  
*Choosing Your Work.* 9005M. 1977.  
*Getting Along With Other Workers.* 9010M. 1977.  
*Getting Started on Your New Job.* 9009M. 1977.  
*Succeeding on Your First Job.* Set of 11 manuals. 9004M. 1977.  
*Taking Care of Yourself.* 9008M. 1979.

The following is available from Science Research Associates, Inc.

*Your Personality and Your Job* by Daniel Sinick. 1971.

The following are available from Vocational Agriculture Services.

*Human Relations in Agricultural Business.* U6003.  
*International Agricultural Exchange and Work Opportunities.* U6021.  
*Motivating Workers in an Agricultural Business.* U6016.

## **Computer Software**

The following are available from COMPRESS.

*Superscoop.* Apple.  
*Superscoop II.* Apple.

## **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Communications Directory.* CIF530.  
*Effective Listening on the Job.* MSU103.  
*Establishing Personal Goals.* MSU100.  
*Utilizing Leadership Skills.* MSU101.

## **Laboratory Resources**

The following is available from Interstate Printers and Publishers, Inc.

*Succeeding on the Job.* Study cards.

## **Films, Videotapes, and Slides**

The following are available from the Bureau of Audio Visual Instruction.

*Learning to Cope.* 09904 (16mm film, color, 25 minutes). Screenscope, 1979.

*A Sense of Purpose.* 08776 (16mm film, color). Learning Corporation of America, 1973.

*Your Image: Make It Work for You.* 10587 (16mm film, color). Farr Films, 1983.

*Work, Work, Work.* 01625 (16mm film, color). New Jersey Public Television, 1976.

The following is available from Creative Educational Video, Inc..

*The Power of Choice.* 309 (VHS videotape).

The following are available from Nasco.

*Concepts of Effective Leadership.* Z10920N (VHS videotape, 30 minutes).

*FFA—Leadership of a Lifetime.* Z10923N (VHS videotape, 20 minutes).

The following VHS videotapes are available from Teaching Aids, Inc.

*Be a Winner: Self-Motivation.* SUN-2129.

*Career Values: What Really Matters to You?* GA-5-667.

*Decision Making Skills: How to Take Control.* FCF-771V.

*Fitting In: A New Look at Peer Pressure.* UL-173V.

*Managing Stress, Anxiety and Frustration.* HFM-725V.

*Peak Performance: How to Become a Peak Performer.* R-DGP-101.

The following are available from Vocational Agriculture Services.

*Communication and Motivation.* F301-5 (58-frame filmstrip).

*Human Relations in Agricultural Business.* F392 (57-frame filmstrip).

## Hydraulics (5-10 days)

This unit deals with agricultural hydraulics technology. Topics include career opportunities, pump types and applications, reservoir needs, directional valve selection, fluid lines, safety valves, hydraulic safety switches, and hydraulic notations.

### Objectives

- To acquaint students with employment information and career opportunities in the hydraulics industry
- To develop student understanding in basic hydraulic principles
- To introduce students to components of hydraulic systems and equipment
- To give students the opportunities to review the operating principles of major hydraulic system components
- To give students the opportunities to learn maintenance and troubleshooting procedures for hydraulic systems

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in agricultural hydraulics—and relate it to their personal needs and aspirations;
- explain the principles involved in hydrodynamics and hydrostatics;
- demonstrate and explain the relationship among pressure, velocity, flow, and power in a hydraulic system;
- identify the basic components and indicate the primary function of a simple hydraulic circuit;
- identify and discuss the characteristics and usage of hydraulic hose, tubing, and piping;
- identify each of the three types of fixed displacement pumps and explain the characteristics of each;
- sketch and explain the operational principles of a variable displacement-unbalanced vane pump, a variable displacement piston-type pump, and an internal and external gear-type pump;
- identify and discuss the purpose of pressure, directional, and control valves;
- trace the flow path of fluid through a direct acting relief valve, a pilot operated relief valve, a pressure sequence valve, and an unloading valve;
- explain the functions and properties of hydraulic fluids;
- discuss and identify fluid contaminants and the methods of removal; and
- describe and apply procedures of maintenance as it relates to the use of fluid lines, couplings, and seals.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions

- Training requirements
- Working conditions
- Opportunities for advancement
- Other factors
- Hydraulic principles **[Mathematics, Science]**
  - Relationship of pressure and flow
  - Transfer of energy
  - Methods of measuring pressure and vacuum
  - Determining the force, power, and horsepower
  - Parallel and series circuits
- Components of a hydraulic circuit **[Science]**
  - Functions of the basic components
  - Location of each component in a circuit
- Principles of pump operation **[Mathematics, Science]**
  - Types of pumps in common use
  - Pump classification
  - Pressure, flow, and displacement rating
  - Determine volumetric efficiency of pumps
  - Advantages and disadvantages of commonly used pumps
- Principles of valve operation **[Science]**
  - Pressure, directional, and flow control valves
  - Operating principles of commonly used valves
- Actuator operation
  - Major types of cylinders
  - Advantages and disadvantages of hydraulic motors
  - Function of accumulators
- Fluids, filters, and strainers
  - Hydraulic fluid recommendations
  - Filter and strainer requirements
- Fluid lines, couplings, and seals
  - Sizing tubing and couplings to a hydraulic system
  - Hose and tubing or pipe
  - Maintenance recommendations
- Troubleshooting
  - Efficiency factors
  - Efficiency checking process in the hydraulic circuit
- Universal symbols **[Science]**

## *Motivational Activities*

- Take field trips to hydraulic operations.
- Assemble different hydraulic pumps.
- View films, filmstrips, and slides on topics related to this unit.
- Invite an implement dealer or mechanic to give a class presentation.
- Post bulletin board displays on hydraulics-related topics.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect samples of basic hydraulic components.
- Construct a simulated heat exchanger and demonstrate its operation.
- Disassemble a cylinder and check override and cushioning devices.
- Determine the cost of replacing a pump on an agricultural tractor.
- Sketch a simple circuit and trace fluid flow in all control valve positions.
- Set up a hydraulic circuit on the test benches and determine its pressure, flow, and horsepower.
- Use a hydraulic tester to determine the efficiency of a unit's hydraulic system.

## *Instructional Materials*

### **Textbooks and References:**

- Basic Hydraulics* by J.R. Daines. St. Paul, MN: Technical Systems, 1970.
- Fluid Power*. Millington, TN: Navy Training Publications Center, 1966.
- Fundamentals of Service—Hydraulics*. Moline, IL: John Deere Company, 1979.
- Implement and Tractor: Reflections on 100 Years of Farm Equipment* by Robert K. Mills. Kansas City, MO: Intertec Publishing, 1986.
- Mobile Hydraulic Testing* by Ronald E. Glenn and James E. Blinn. Chicago: American Technical Society, 1970.

### **Bulletins and Pamphlets**

The following are available from the American Association for Vocational Instructional Services.

- Hydraulics for Tractors and Other Mobile Equipment Volume II: Inspecting and Testing*. 121. 1974.
- Safe Tractor Operation and Daily Care*. 103. 1981.

The following is available from the American Oil Company.

### *Hydraulic Power Transmission*

The following is available from the National Fluid Power Association.

### *A Course Outline for an Introduction to Fluid Power*



The following is available from the Owatonna Tool Company.

*Basic Hydraulic Principles and Trouble Shooting Suggestions*

The following are available from the Sperry Rand Corporation.

*Mobile Hydraulics Manual—Basal  
Practical Hydraulics*

The following is available from Technical Publications, Inc.

*I & T Shop Service*

The following is available from the United States Government Printing Office.

*Vocational Education and Occupation Handbook. FS 5.280:80061.*

**Periodicals**

*Hydraulics and Pneumatics  
Implement and Tractor*

**Computer Software**

The following are available from Hobar Publications.

*Hydraulics and Related Review. Apple, IBM, TRS, Macintosh.  
Introduction to Machinery Management. Apple.  
Tractor Preventative Maintenance Review. Apple, IBM, TRS, Macintosh.*

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Tractors. Apple, IBM.*

**On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Hydraulic Cleaning. CSU209.  
Hydraulic Fluids. CSU208.  
Hydraulic Hoses. CSU212.  
Hydraulic Leaks. CSU210.  
Hydraulic Repair. CSU213.  
Hydraulic Replacement. CSU211.  
Hydraulic Safety. CSU207.  
Hydraulic Systems. CSU206.*



## **Laboratory Resources**

The following is available from the John Deere Company.

*Hydraulics Workbook*. 1979.

## **Films, Videotapes, and Slides**

The following is available from the Jam Handy Organization.

*Basic Principles of Hydraulics*. (16mm film.)

The following is available from the John Deere Company.

*Hydraulics*. FOS-10035 (209 color slides). 1979.

The following is available from Sperry Rand Corporation.

*Controlled Power*. (16mm film.)

The following are available from United World Films, Inc.

*Application of Pascal's Law Part I*. (16mm film.)

*Application of Pascal's Law Part II*. (16mm film.)

The following are available from the Visual Education, Inc.

*Applied Hydraulics*. (Slides.)

*Basic Hydraulics*. (Slides.)

*Hydraulic Cylinders*. (Slides.)

*Hydraulic Pumps*. (Filmstrip.)

*Hydraulic System for Grain Harvesting*. (Slides.)

*Hydraulic Valves*. (Filmstrip.)

## **Equipment and Facilities**

Hydraulic test bench

Example pumps (rejects/nonrepairables from manufacturers, local dealers, or salvage yards)

## Landscaping (10-20 days)

This unit deals with the management and care of landscaping and its related fields. Topics include career opportunities, landscape design, construction materials, plant material usage, economic analysis, and landscape maintenance.

### *Objectives*

- To acquaint students with employment information and career opportunities in the landscape area
- To provide students with instruction in planning and creating a landscape design
- To assist students to prepare cost estimates for a given landscape design
- To increase student understanding of the uses of various landscape structures, materials, and plants
- To help students increase their skills in identifying commonly used landscaping plants
- To provide students with practice in establishing trees, shrubs, and other landscape plants using recommended procedures
- To develop student understanding of basic landscape maintenance practices, including mulching, pruning, controlling weeds, and providing winter protection

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job description, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the landscaping industry—and relate it to their personal needs and aspirations;
- follow the steps of creative thinking as applied to landscape design;
- complete a site analysis following proper procedure;
- use the proper graphic symbols for all of the elements in a landscape design;
- fill out a client's family inventory checklist;
- complete a rough design of an area using an overlay, doing goose-egg planning, laying out traffic patterns, and charting the climatic factors of the site;
- determine the cost of establishing a landscape design;
- explain how to use plant materials in the landscape such as flowers, ground covers, shrubs, and trees;
- explain the advantages and disadvantages of the different materials used for mulching;
- demonstrate the pruning techniques for different plant materials; and
- demonstrate the different methods of winter protection of the plant material in a landscape.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

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- Opportunities for advancement
- Other factors
- Introduction to landscape design [Social Studies]
  - History
  - Landscape rationale
  - Landscaping planning needs
  - Creative thinking
- Site analysis [Science]
  - Environmental factors
  - Views
  - Drainage
  - Existing plants
  - Existing natural resources
  - Existing structures
  - Soil
  - Local ordinances
- Graphics [Science]
  - Construction material
  - Trees
    - Evergreen
    - Deciduous
  - Shrubs
    - Evergreen
    - Deciduous
  - Ground covers
  - Vines
  - Flower beds
  - Other landscape symbols
  - Lettering
  - Plant chart
- Rough landscape design
  - Overlays
  - Goose-egg planning
  - Traffic patterns
  - Environmental factors
- Landscape layout
  - Design tools
  - Proper layout
- Landscape structures
  - Patio
  - Decks
  - Enclosure structures
  - Surfaced areas

- Retaining walls
- Garden embellishments
- Irrigation systems
- Pools
- Landscape construction material
  - Different woods
  - Rock
  - Soil
  - Blocks
  - Other
- Design principles [Science]
  - Unity
  - Simplicity
  - Balance
  - Emphasis
  - Sequence
  - Scale
  - Variety
- Plant selection factors [Science]
  - Soil
  - Hardiness zone
  - Form
  - Function
  - Size
  - Texture
  - Color
- Shrubs in the design [Science]
  - Accent plants
  - Topiary
  - Specimen plants
  - Screens
  - Foundation plantings
  - Mass plantings
  - Group plantings
  - Traffic control
  - Shade
  - Windbreak
- Trees in the design [Science]
  - Frame
  - Mask awkward architectural elements
  - Background
  - Shade
  - Street trees
  - Windbreaks

- Accent plant
- Specimen plant
- Ground covers in the design [Mathematics]
  - Erosion control
  - Use instead of grass or mulch
  - Add to the total design
- Vines in the design [Science]
  - Mask awkward architectural elements
  - Ornamental
- Flowers in the design [Science]
  - Types
    - Annuals
    - Perennials
    - Bulbs
    - Biennials
    - Tender perennials
  - Color schemes
  - Flower borders
  - Flower beds
  - Cut flowers
- Public area design [Science]
  - Elements
    - Trees
    - Shrubs
    - Lawns
    - Structures
  - Entrance way plantings
  - Foundation plantings
  - Corner plantings
  - Side plantings
  - Porch plantings
- Living area design
  - Structures
    - Pools
    - Decks
    - Fences
  - Trees
  - Shrubs
  - Flower beds
- Service area design
  - Structures
  - Plantings

- Cost estimation [Mathematics, Social Studies]
  - Cost of material
  - Labor cost
- Landscape establishment [Science]
  - Planting
    - Bare root stock
    - Balled and burlapped
    - Container grown
  - Staking
  - Wrapping
  - Mulching
  - Fertilizing
- Maintaining the landscape [Science]
  - Pruning
  - Fertilizing
  - Mulching
  - Controlling weeds
  - Watering
  - Winter protection

### *Motivational Activities*

- View films, filmstrips, and slides about landscape design, establishment and maintenance of plant material, and career opportunities in landscaping.
- Take field trips to nurseries, landscape sites, and parks.
- Invite resource speakers from landscape design firms or nurseries to give class presentations.
- Post bulletin board displays featuring topics related to this unit.
- Develop charts on plant height and spread.
- Discuss the types and uses of various landscape designs.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Interview people who work in the landscape industry.
- Perform a site analysis.
- Using overlays, draw out a goose-egg plan and map out traffic patterns and climatic factors for a given area.
- Practice designing the different areas of a landscape for different house styles and yard sizes.
- Develop a list of types of wood that can be used in landscape construction.
- Prepare a list of types of materials that can be used for walkways.
- Collect specimens of different textures of plant material.
- Design a bed using annual and perennial plants.
- Analyze a landscape design and determine the cost.

## *Instructional Materials*

### **Textbooks and References**

- Approved Practices in Beautifying the Home Grounds* by Norman K. Hoover. 5th ed. Danville, IL: Interstate, 1979.
- Conifers for Your Garden* by Adrian Bloom. New York: Charles Scribner's Sons, 1975.
- Home Landscaping*. Clearwater, FL: Countryside Books, 1984.
- Horticulture—A Basic Awareness* by Robert F. Baudendistel. 2nd ed. Reston, VA: Reston Publishing, 1982.
- Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada* by Liberty H. Bailey. New York: Macmillan, 1976.
- How to Have a Beautiful Lawn* by James B. Beard. 3rd ed. College Station, TX: Beard Books, 1983. Available from National Farm Book Company.
- Identification of Grasses and Legumes* by Howell Newman Weaton. rev. ed. Columbia, MO: Instructional Materials Laboratory, 1980. Available from Hobar Publications.
- Introductory Horticulture* by H. Edward Reiley and Carrol L. Shry. Albany, NY: Delmar, 1983. Available from National Farm Book Company.
- Landscape Gardening* by James Underwood Crocket. New York: Time-Life Books, 1971.
- Landscape Design: A Practical Approach* by Leroy G. Hannebaum. Reston, VA: Reston Publishing, 1981.
- Landscaping: Principles and Practices* by Jack E. Ingels. 3rd ed. Albany, NY: Delmar, 1987.
- Nursery Crops and Landscape Designs for Agribusiness Studies* by George S. Williams and Ronald L. Shumack. 2nd ed. Danville, IL: Interstate, 1984.
- Pictorial Library of Landscape Plants* by Jane M. Colman Helmer. 2nd ed. Kalamazoo, MI: Merchants Publishing, 1979.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

- Greenskeeping*. 218X. 1981.
- Lawn Weeds and Their Control*. 222X. 1987.
- Picture Clues to Turfgrass Problems*. 231X. 1982.
- Turf Management*. 2031X. 1988.

The following are published by Ortho Books and are available from National Farm Book Company.

- All About Ground Cover*. 1977.
- All About Landscaping*. 1984.
- All About Lawns*. 1979.
- Garden Construction Know How*. 1984.
- Gardening With Color*. 1984.
- How to Select and Care for Shrubs and Hedges*. 1984.
- The World of Trees*. 1977.
- Wood Projects for the Garden*. 1984.

The following are published by Sunset Books/Lane Publishing and are available from National Farm Book Company.

*Basic Gardening Illustrated.* 1981.  
*Fences and Gates.* 4th ed. 1981.  
*Garden and Patio Building Book.* 1983.  
*Landscaping Illustrated.* 1984.  
*Landscaping and Garden Remodeling.* 1978.  
*Patios and Decks.* 1979.  
*Walks, Walls and Patio Floors.* 3rd ed. 1973.

#### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Landscape Plants that Attract Birds.* G1609.  
*Landscaping for Energy Conservation.* A3066.  
*Landscaping Your Home.* A81L1111.  
*Planning and Designing Your Home Landscape.* G1923.  
*Salt Injury to Landscape Plants.* A2970.  
*Selecting, Planting and Caring for Your Shade Trees.* A3067.  
*Street Trees for Wisconsin.* A2014.  
*Tree and Shrub Fertilization.* A2308.

The following is available from the Soil Conservation Service.

*Landscaping to Reduce Year-Round Energy Bills.* YS-80-9.

The following are available from the United States Department of Agriculture.

*Growing Lilacs.* Home and Garden Bulletin 199.  
*Indoor Gardening.* Home and Garden Bulletin 220.  
*Transplanting Ornamental Trees and Shrubs.* Home and Garden Bulletin 192.

#### Periodicals

*Grounds Maintenance Magazine*  
*Horticulture*  
*FFA New Horizons* (formerly *The National Future Farmer*)

#### Computer Software

The following are available from Hobar Publications.

*Home and Farmstead Safety.* Apple, IBM, TRS, Macintosh.  
*Horticulture and Related Review.* Apple, IBM, TRS, Macintosh.  
*Shapes, Areas and Volumes.* Apple.



The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Evergreen Trees and Shrubs.* Apple, IBM.

*Micro-Tutor: Landscape Design I and II.* Apple.

*Micro-Tutor: Landscape Maintenance.* Apple.

*Micro-Tutor: Turf and Groundcovers.* Apple, IBM.

#### **Laboratory Resources**

The following are available from Hobar Publications.

*Horticulture Tool Maintenance Worksheets.* 709.

*Mathematics for Horticulture.* 9512. 1982.

*Horticultural Competency Worksheets.* 723.

*Nursery Worksheets.* 737.

The following are available from the Pennsylvania Instructional Materials Service.

*Landscape Design*

*Landscape Maintenance and Establishment*

#### **Films, Videtapes, and Slides**

The following is available from the Pennsylvania Instructional Materials Service.

*Commonly Used Trees, Shrubs, Vines and Groundcover.* (52 color slides.)

The following are available from Nasco.

*Deciduous Ornamental Shrubs of Northern U.S.* C10216N (140 color slides).

*Deciduous Shade and Ornamental Trees of Northern U.S.* C10217N (81 color slides).

The following are available from Ohio Agricultural Education Curriculum Materials Service.

*Landscape Design.* 2015S (187 color slides with script). 1976.

*The Maples.* 2029S (60 color slides with script). 1977.

*Narrow Leaved Evergreens.* 2113S (87 color slides with script). 1987.

The following are available from Vocational Agriculture Services.

*Landscape Planning Plan Series* consists of the following four filmstrips, each with script and study guide.

"One Story Ranch Style Homes." F625-1.3 (29 frames).

"Split Level Homes." F625-1.1 (57 frames).

"Two Story Cape Cod Homes." F625-1.4 (42 frames).

"Two Story Victorian Style Homes." F625-1.4 (21 frames).

The following are available from Vocational Education Productions.

*Elements of Pruning*. 6-012-100H (VHS videotape).

*Volume I: The Principles of Landscape Design*. Z10821N (VHS videotape, color, 19 minutes).

*Volume II: The Landscape Design Process*. Z10822N (VHS videotape, color, 26 minutes).

The following is available from Vocational Media Associates.

*Principles of Landscaping*. 30797-93 (Six color filmstrips with program guide and reproducible masters).

### **Equipment and Facilities**

Hand pruners

Pruning saws

Pole pruning saw

Lopping shears

Hedge shears

Planting spades

Garden tools

Rake

Shovel

Hoe

Spade

Fork

Tree wrap

Three-dimensional landscaping kit

## Livestock Marketing (15-30 days)

This unit deals with livestock marketing. Topics include career opportunities, the futures market and forward contracting, market trends, and market evaluation skills that relate to livestock production and agribusiness.

### *Objectives*

- To acquaint students with employment information and career opportunities in the livestock marketing industry
- To help students understand the marketing system from the producer to the consumer
- To help students develop criteria for choosing the best marketing channel for a specific operation
- To facilitate student inquiry into trends affecting the market for livestock
- To develop student understanding of the futures market
- To acquaint students with skills related to market evaluation and outlook information

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the livestock marketing industry—and relate it to their personal needs and aspirations;
- compare the different methods of marketing livestock;
- choose the best marketing system for the local area;
- describe the current marketing opportunities available to area producers;
- discuss the reasons for the seemingly wide price spread between producers and consumers;
- describe the meat distribution channels;
- contrast the various methods of selling and pricing;
- suggest procedures which will help prevent losses in shipping;
- describe a meat processing plant operation;
- explain the key forces that determine the price of meat; and
- discuss the various points or levels in the marketing system.
- compare and contrast video marketing and live marketing

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job description
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Area markets [Mathematics, Social Studies]
  - Names of local outlets
  - Distance
  - Location
  - Price
  - Feed and water at the marketplace
  - Insurance
  - Transportation
  - Other services offered
  - Number of buyers
- Trends and development [Mathematics, Social Studies]
  - Computerized selling
  - Innovation in auction markets
  - Changes in public markets
  - Video marketing
- Forward contracting of livestock [Careers, Mathematics]
  - Methods
  - Advantages and disadvantages
- Role of the futures market [Careers, Mathematics]
  - Cattle
  - Hogs
  - Feeder cattle
- Market outlook information [Careers, Mathematics]
  - Sources
  - Developing a market plan
  - Professional assistance
  - Livestock market improvements
    - Education programs
    - Research marketing programs
    - Advertisement
    - Exportation

### *Motivational Activities*

- Take field trips to a telemarket, auction market, local buying stations, and central markets.
- Take a field trip to a packing plant.
- View slides, filmstrips, and films related to topics in this unit.
- Post bulletin board displays on related topics.
- Invite marketing specialists to give class presentations.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Plot prices on a graph and compare the percent of the consumer's dollar the producer receives for meat with other agricultural products of the community.

- Plot local and central market prices of live cattle, hogs, and sheep for the duration of the class.
- Plot future prices of cattle, hogs, and sheep for the duration of the class.
- Prepare a bulletin board display depicting a terminal public livestock market.
- Demonstrate the practices that may be used to reduce losses in shipping livestock to market.

### *Instructional Materials*

#### **Textbooks and References**

- Farm and Ranch Business Management*. Moline, IL: John Deere Company, 1987.
- Federal Marketing Programs in Agriculture: Issues and Options* by Walter Armbruster et al. Danville, IL: Interstate, 1983.
- Fundamentals of Modern Marketing* by Ed Cundiff et al. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1985. Available from National Farm Book Company.
- Marketing Concepts, Strategies and Decisions* by David J. Reibstein. Englewood Cliffs, NJ: Prentice Hall, 1985. Available from National Farm Book Company.
- Marketing Farm Products: Economic Analysis* by Goeffry Shepard and Gene Futrell. 7th ed. Ames, IA: Iowa State University Press, 1982. Available from National Farm Book Company.
- Marketing of Agricultural Products* by Richard L. Kohls and Joseph N. Uhl. 6th ed. New York: Macmillan, 1986. Available from National Farm Book Company.
- Modern Marketing of Farm Products* by William P. Mortenson. 3rd ed. Danville, IL: Interstate, 1977. Available from National Farm Book Company.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Futures Markets—Development and Language*. A2913.
- Producer Marketing Management: Delivery on a Hog Futures Contract*. NCR217-7.
- Producer Marketing Management: Delivery on a Live Cattle Futures Contract*. NCR217-6.
- Producer Marketing Management: Understanding and Using Basis for Livestock*. NCR217-5.

#### **Periodicals**

- Beef*
- Drovers Journal*
- Kiplinger Agriculture Letter*
- Wall Street Journal*

#### **Computer Software**

The following is available from Hobar Publications.

- Agricultural Marketing and Commodity Futures*. Apple.

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Livestock Buying.* ADN61.

*Livestock Selling Plans.* ADN56.

*Livestock Shrink.* CSU301.

*Marketing Alternatives.* CSU297.

*Marketing Beef.* CSU381.

*Marketing Swine.* CSU661.

### **Laboratory Resources**

The following is available from the John Deere Company.

*Farm and Ranch Business Management Workbook.* 1987.

### **Films, Videotapes, and Slides**

The following is available from the Grange Farm Film Foundation.

*Your Profit in Futures.* (16mm film.)

The following is available from the Instructional Materials Laboratory.

*Agricultural Marketing.* Ag-B1-T (29 Transparencies).

The following is available from Modern Talking Picture Service, Inc.

*Cattle - Fax: New Marketing Information Service.* (16mm film.)

The following are available from Nasco.

*Agricultural Cooperatives.* C10554N (Filmstrip with cassette).

*Agricultural Marketing.* C10556N (Filmstrip with cassette).

## **Livestock Reproduction and Artificial Insemination (5-15 days)**

This unit deals with livestock reproduction and artificial insemination. Topics include career opportunities, anatomy and cycles of reproduction systems, history and techniques of artificial insemination, semen collection, and management practices for reproductive efficiency.

### *Objectives*

- To acquaint students with employment information and career opportunities in the livestock reproduction and artificial insemination industry
- To develop student awareness of the history, advantages, and contributions of artificial insemination
- To emphasize to students the impact artificial insemination has had on improving U.S. farm animals
- To familiarize students with the anatomy and physiology of the male and female animal
- To familiarize students with the hormonal systems of the male and female animal
- To introduce and explain to students the procedures for semen collection and evaluation
- To create student awareness and understanding of techniques used in preserving and extending semen
- To acquaint students with the important aspects of sound heat detection and breeding programs
- To emphasize to students the importance of a sound health and sanitation program
- To demonstrate to students the proper artificial insemination technique

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in livestock reproduction and artificial insemination—and relate it to their personal needs and aspirations;
- summarize the history of artificial insemination;
- chronologically describe the hormonal changes during the estrous cycle;
- diagram the female reproductive tract;
- describe the hormonal changes during a bull's development;
- diagram the bull's reproductive tract;
- describe the advantages of artificial insemination;
- discuss the procedures of semen collection and quality control;
- understand semen dilution or extension and semen storage procedures;
- list procedures for artificial insemination; and
- describe reproductive diseases in the male and female.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions

- Training requirements
- Working conditions
- Opportunity for advancement
- Other factors
- Artificial insemination history [Social Studies]
  - Arabian horse experiments
  - Spallangani's first controlled experiments
  - French horse experiments
  - Russian horse experiments
  - United States associations
  - Wisconsin associations
- Female reproductive system
  - Ovaries
  - Tubular genitalia
- Estrous cycle [Science]
  - Regulatory hormones
  - Cycle periods
  - Time sequences
  - Ovarian changes
  - Tubular changes
- Ovum pathway [Science]
  - Ovogenesis
  - Mature ovum
  - Ovulation
  - Ovum transport
  - Spermatozoan penetration
  - Pronuclei formation and fusion
  - *In Vitro* fertilization and parthenogenesis
  - Superovulation and ovum transfer
  - Sex determination
  - Multiple fertilizations
- Gestation [Science]
  - Reproductive tract preparation
  - Ovum periods
  - Embryonic period
  - Fetal period
  - Uteral changes and contents
  - Hormonal changes
  - Mammary gland changes
  - Nutritional requirements
  - Diagnosis of pregnancy
  - Gestation length



- Parturition [Science]
  - Stages
  - Normal and abnormal presentation
  - Involution of the uterus
  - Calf oxygen supply
- Male reproductive system [Science]
  - Scrotum, testes, and penis
  - Excurrent ducts
  - Accessory sex organs
  - Signs of sexual maturity
- Spermatogenesis [Science]
  - Spermatocytogenesis
  - Spermiogenesis
  - Endocrine control
  - Maturation steps
  - Excurrent duct passage
  - Epididymis function
  - Ejaculation
  - Unejaculated spermatozoa
- Semen components and functions [Science]
  - Seminal reproductive tract contributions
  - Properties and constituents of semen
  - Sperm cell composition
  - Spermatozoon morphology
  - Spermatozoon motility
- Spermatozoal metabolism [Science]
  - Glycolysis
  - Respiration
  - Aerobic glycolysis
  - Spermatozoa metabolic rate factors
- Spermatozoa physiology in the female reproductive tract [Science]
  - Vaginal tract
  - Spermatozoa transportation
  - Spermatozoa survival
  - Semen and vaginal tract interactions
- Semen collection
  - Methods
  - Animal control facilities
  - Collection procedures
- Semen evaluation [Mathematics, Science]
  - Gross examination
  - Morphology and concentration

- Assessment of spermatozoa motility
- Differential staining of live and dead spermatozoa
- Metabolic activity measurements
- Resistance
- Semen viability [Mathematics]
  - Statistical basis
  - Semen evaluation variance
  - Fertility variance
  - Physical review
- Spermatozoon preservation [Science]
  - Preservation at above and below freezing temperatures
  - Freeze-drying
  - Chemical control
  - Control of semen bacterial contaminants
- Insemination
  - Technique
  - Placement
  - Optimum timing
  - Semen amount
- Conception rate [Science]
  - Sterility and reduced fertility
  - Reproductive efficiency
  - Causes of misconception
  - Insemination order number and fertility level
  - Estrous cycle intervals
  - Male reproductive efficiency and fertility characteristics
- Physiological and psychological misconception causes [Science]
  - Age
  - Season
  - Endocrine disturbances
  - Psychological disturbances
- Female management factors [Science]
  - Good husbandry
  - Heifer care
  - Age and size at first breeding
  - Calving interval
  - Lactation and reproduction interrelationship
  - Nutrient requirements
- Male management practices [Science]
  - Useful life expectancy
  - Calf to maturation
  - Age and size

- Frequency and extent of use
- Stress
- Nutrient requirements of growing dairy bulls versus mature bulls
- Exercise
- Transport and fertility
- Safety practices

### *Motivational Activities*

- Take field trips to breeders services' farms and facilities.
- Invite an artificial-insemination technician to give a class presentation.
- Post bulletin board displays on topics related to this unit.
- Provide current instructional media on artificial insemination and animal reproduction.
- View films, videotapes, and slides on related topics.
- Demonstrate proper heat detection techniques.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Dissect a cow's reproductive tract.
- Label female reproductive tract parts.
- Label male reproductive tract parts.
- Diagram hormonal charts showing their cause and effect.

### *Instructional Materials*

#### **Textbooks and References**

- Anatomy and Physiology of Farm Animals* by R.D. Frandson. 4th ed. Philadelphia: Lea & Febiger, 1986.
- Animal Genetics* by Frederick B. Hutt. 2nd ed. New York: Ronald Press, 1982.
- Applied Animal Reproduction* by John W. Fuguay and Joe Bearden. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Approved Practices in Dairying* by W.T. Mortenson and E. M. Juergenson. 4th ed. Danville, IL: Interstate, 1977. Available from National Farm Book Company.
- Approved Practices in Swine Production* by E.M. Juergenson and James K. Baker. 6th ed. Danville, IL: Interstate, 1979. Available from National Farm Book Company.
- The Artificial Insemination and Embryo Transfer of Dairy and Beef Cattle* by H.A. Herman and F.W. Madden. 7th ed. Danville, IL: Interstate, 1987.
- Beef Cattle Science* by Eugene M. Ensminger. 6th ed. Danville, IL: Interstate, 1987. Available from National Farm Book Company.
- Beef Production and the Beef Industry: A Beef Producer's Perspective* by Robert E. Taylor. Edina, MN: Burgess International, 1984. Available from National Farm Book Company.
- Controlled Breeding in Farm Animals* by I.R. Gordon. Elmsford, NY: Pergamon, 1983.
- Dairy Production* by Clarence E. Bundy and Ronald V. Diggins. 6th ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Livestock and Poultry Production* by Clarence E. Bundy and Ronald V. Diggins. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1982. Available from National Farm Book Company.
- Livestock Husbandry Techniques* by J.I. McNitt. Dobbs Ferry, NY: Sheridan House, 1983.

*Reproduction in Farm Animals* by E.S.E. Hafez. 5th ed. Philadelphia: Lea & Febiger, 1987.  
*Scientific Farm Animal Production* by Ralph Bogart and Robert E. Taylor. 3rd ed. New York: Macmillan, 1988.  
*Sheep and Goat Science* by Eugene M. Ensminger. 5th ed. Danville, IL: Interstate, 1986. Available from National Farm Book Company.  
*The Sheep Book* by Ron Parker. Danville, IL: Interstate, 1984.  
*Structure and Development of Meat Animals* by H.J. Swattand. Englewood Cliffs, NJ: Prentice Hall, 1984.  
*Swine Production* by Clarence E. Bundy and Ronald V. Diggins. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.

#### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Artificial Insemination of Poultry*. NCR216.  
*Artificial Insemination in Swine*. PIH64.  
*Beef Cow-Calf Health Guide*. A3042.  
*Breeding Chutes to Simplify Artificial Insemination*. A2803.  
*Calving Difficulty in Beef Cattle*. BIF FS6.  
*Care of the Sow During Farrowing and Lactation*. PIH46.  
*The Story of Artificial Insemination Research*. R3266.

The following are available from *Dairy Herd Management* magazine.

*Artificial Insemination Management Means Heat Detection and Good Records*. January 1977.  
*Direct Herd Breeding: A New Hat for the Dairyman*. January 1977.

The following is available from *Hoard's Dairyman* magazine.

*Dairyman Cattle Sterility*

The following is available from Madison Area Technical College.

*Animal Technician Brochure*

#### Periodicals

*Farm Journal*  
*Farmers' Digest*  
*Successful Farming*

#### Computer Software

The following are available from ACS Software Publishing.

*Cattle Management Game*. Apple.  
*Sheep Management Game*. Apple.  
*Swine Management Game*. Apple.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: Beef.* Apple.

*Agri-ID: Dairy Cow.* Apple.

*Agri-ID: Sheep.* Apple.

*Agri-ID: Swine.* Apple.

*Agri-Quiz: Beef.* Apple, IBM.

*Agri-Quiz: Dairy I and II.* Apple, IBM.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Beef Production.* Apple, IBM.

*Micro-Tutor: Sheep Production.* Apple, IBM.

*Micro-Tutor: Swine Production.* Apple, IBM.

### Films, Videotapes, and Slides

The following is available from the American Angus Association.

*The Good Life - Breeding Registered Angus.* (16mm film, color, 17 minutes.) 1983.

The following is available from Hobar Publications.

*Artificial Insemination in Beef Cattle.* 421 (28 color slides with cassette and script, nine minutes).

The following is available from the Holstein-Friesian Association of America.

*A Veterinarian Looks at Functional Type.* (16mm film, color, 22 minutes.)

The following is available from Midwest Breeders.

*Miracle of Reproduction.* (Slides.)

The following are available from Nasco.

*Artificial Insemination of Beef and Dairy Cattle.* C10547N (Filmstrip with cassette).

*Cattle Breeding.* OT1266N (Four transparency masters).

*Signs of Heat in Cattle.* C10085N (15 color slides).

The following is available from Photocom.

*The Reproduction Kit.* 01-413-0 (Two filmstrips with cassettes and scripts).

The following are available from Teaching Aids, Inc.

*Animal Acquisition/Reproduction.* CD15400678 (VHS videotape, color).

*Modern Cattle Breeding Techniques.* P-02-308011 (Two filmstrips with cassettes and program guide).

The following are available from Tri-State Breeders.

*Better Living Thru Artificial Insemination.* (16mm film.)

*Known by the Sires We Keep.* (16mm film.)

#### Equipment and Facilities

Reproductive tracts

Practical tests

Identify reproductive tracts

Label diagrams of reproductive tracts

## Livestock Selection and Evaluation (30-40 days)

This unit deals with meat animal selection and evaluation. Topics include career opportunities, breed identification, anatomy, oral and written livestock class placing, production records used in evaluation, and grading livestock and carcasses.

### Objectives

- To acquaint students with employment information and career opportunities in the areas of livestock judging and grading
- To provide students with instruction and practice in identifying various livestock breeds
- To develop student appreciation for the value of livestock judging skills
- To instruct students about the characteristics of an exemplary livestock judge
- To provide students with instruction and training in examining and placing animals and in giving reasons for class placing
- To provide students with opportunities to practice livestock judging skills
- To develop student understanding of livestock and carcass examination and grading

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in evaluating and selecting livestock—and relate it to their personal needs and aspirations;
- identify and compare the characteristics of the various beef breeds;
- identify and list all parts of an animal in each species;
- place classes of animals using type as the criterion for evaluation;
- use a systematic approach in giving oral and written reasons for a class placing;
- place a class of livestock using production records as the criterion for evaluation; and
- grade market classes of livestock and carcasses according to muscling and finish.

*Subject Matter* (Basic skills integration areas are shown in brackets following title)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Judging livestock [Careers, Science]
  - Selection
    - Breeding stock
    - Market and slaughter animals

- Judging skill
  - Formal instruction
  - Experience
- Livestock judge characteristics
  - Knowledge of livestock animals
  - Ability to mentally picture the "ideal animal"
  - Observation ability
  - Logical analysis ability
  - Independent thought process
  - Written and oral reasoning skills
  - Knowledge of breed body parts
    1. name and location
    2. function
    3. degree of importance
- Animal class examination and placing
  - Evaluation system
  - Scorecard use

### *Motivational Activities*

- Take field trips to buying stations and processing plants.
- Invite livestock buyers or judges to give class presentations.
- Post bulletin board displays on topics related to this unit.
- Arrange for students to attend animal judging shows or fairs.
- View films, videotapes, and slides on related topics.

### *Learning Activities*

- Judge livestock from auction barns using satellite technology to market livestock.
- Judge livestock on field trips to local farms.
- Enter livestock judging contests.
- Participate in local fairs and shows.
- Judge livestock using pictorial classes from breed associations.
- Enter carcass judging contests.

### *Instructional Materials*

#### **Textbooks and References**

- Animal Genetics* by Frederick B. Hutt and Benjamin Rasmusen. 2nd ed. New York: John Wiley and Sons, 1982.
- Animal Science and Industry* by Duane Acker. Englewood Cliffs, NJ: Prentice Hall, 1983.
- Beef Cattle* by A.L. Neumann and Keith S. Lusby. 8th ed. New York: John Wiley and Sons, 1986.
- Beef Cattle Production* by John F. Lasley. Englewood Cliffs, NJ: Prentice Hall, 1981.
- Beef Production* by Clarence E. Bundy and Ronald V. Diggins. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Livestock Judging, Selection, and Evaluation* by Malcolm W. Beeson and J.E. Nordby. 2nd ed. Danville, IL: Interstate, 1978.



*The Meat We Eat* by John R. Romans et al. 12th ed. Danville, IL: Interstate, 1985.  
*Modern Breeds of Livestock* by Hilton M. Briggs. 4th ed. New York: Macmillan, 1980.  
*Principles of Animal Agriculture* by Charles E. Stufflebeam. Englewood Cliffs, NJ: Prentice Hall, 1983.  
*Sheep and Goat Science* by M.E. Ensminger and R.O. Parker. 5th ed. Danville, IL: Interstate, 1986. Available from National Farm Book Company.  
*The Stockman's Handbook* by M.E. Ensminger. 6th ed. Danville, IL: Interstate, 1983.  
*Structure and Development of Meat Animals* by H.J. Swatland. Englewood Cliffs, NJ: Prentice Hall, 1984.  
*Swine Production* by Clarence E. Bundy and Ronald V. Diggins. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Boar Selection: Guidelines for Commercial Producers.* PIH9.  
*Carcass Evaluation.* PIH42.  
*Culling the Commercial Cow Herd.* BIF:FS7.  
*Identify Your Cattle.* A2834.  
*Modern Commercial Beef Sire Selection.* BIF:FS9.  
*Selection for Feet and Leg Soundness.* PIH101.  
*Selection Guidelines for the Feedstock Producer.* PIH58.  
*USDA Grades for Market Hogs and Pork Carcasses.* A3349.  
*Utilizing Performance Data in Judging Classes.* BIF:FS5.

The following is available from the National Lifestock and Meat Board.

*Meat Judging Handbook.* 1987.

The following are available from the United States Department of Agriculture.

*Breeds of Swine.* Farmers Bulletin 1263. 1980.  
*Finishing Beef Cattle.* Farmers Bulletin 2196. 1978.  
*The Farm Beef Herd.* Farmers Bulletin 2126. 1984.

#### **Periodicals**

*American Breeders Service Journal*  
*Farm Journal*  
*Farmers' Digest*  
*Successful Farming*

#### **Computer Software**

The following are available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Beef.* Apple, IBM.  
*Agri-Quiz: Swine.* Apple, IBM.  
*Agri-ID: Beef.* Apple.

*Agri-ID: Swine.* Apple.

### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Livestock or Dairy Selection.* HS128.

*Selecting Breeding Stock.* HS713.

### Laboratory Resources

The following is available from Vocational Education Productions.

*The Livestock Judging Manual.* 1-428-820H. 1982.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Livestock Management Series.* 401X.

The following is available from the National Livestock and Meat Board.

*Meat Evaluation Handbook.* 17-602. 1987.

The following is available from the National Vocational Agriculture Book Company.

*Livestock Production Student Study Manual.* 1973.

### Films, Videotapes, and Slides

The following is available from the Iowa State University, Department of Animal Science.

*Beef Carcass Slides.* (35 slides.)

The following is available from Nasco.

*Classes of Swine with Cutout Information.* (60 slides.)

The following are available from the Bureau of Audio Visual Instruction.

*Evaluating Market Beef and Lambs for Yield Grade.* 11353 (VHS videotape, color, 28 minutes) or 08864 (16mm film, color, 28 minutes). University of Wisconsin, Department of Agricultural Journalism, 1982.

*Evaluating Market Hog Performance.* 11855 (VHS videotape, color, 28 minutes) or 08860 (16mm film, color, 28 minutes). University of Wisconsin, Department of Agricultural Journalism, 1983.

*Today's Guidelines for Pork.* 07693 (16mm film, color, 20 minutes). University of Wisconsin, Department of Agricultural Journalism, 1970.

The following are available from Photocom.

*Advanced Beef Quality Grading.* 38-106 (VHS videotape, 36 minutes).

*Beef Evaluation.* 36017 (VHS videotape, 60 minutes).

*Beef Selection Kit.* 01-416-0 (Three filmstrips with cassettes and scripts).

*Feeder Cattle Grading.* 34-022 (VHS videotape, 35 minutes).

*Fundamental Livestock Judging.* 34-012 (VHS videotape, 40 minutes).

*Livestock Judging.* 01-428-0 (Slides, nine sets, may be ordered individually).

*Oral Reasons for Livestock Judging.* 34-017 (VHS videotape, 30 minutes).

*Poultry Judging.* 01-460-200 (Two filmstrips with cassettes and scripts).

The following are available from Vocational Education Productions.

*Beef Reproduction, Breeding, and Calving—I.* 6-040-104V2 (VHS videotape, 30 minutes).

*Feeder Pig Selection.* 1-440-236H (Filmstrip with cassette and script).

*Feedlot Production.* 1-424-203H (Filmstrip with cassette and script).

*Market and Feeder Cattle Selection.* 1-416-202H (Filmstrip with cassette and script).

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## **Local, State, National, and International Agricultural Production Levels and Trends (5-15 days)**

This unit deals with local, state, national, and international agricultural production levels and trends. Topics addressed include career opportunities, marketing, economic contributions to agribusiness, agricultural and nonagricultural interrelationships, and agricultural trends.

### *Objectives*

- To develop student understanding of the range and scope of career opportunities in the field of agriculture
- To develop student appreciation for the world's dependence on agriculture
- To increase student comprehension regarding agriculturally related contributions to state and national economies
- To develop student understanding of the Wisconsin agriculture industry complex and its infrastructural supports
- To examine historical trends in agriculture at the international, national, state, and local levels

### *Competencies*

At the conclusion of this unit, students will be able to

- explain career opportunity trends on the state and national level;
- appreciate the world's need for agriculture;
- understand the importance of agriculture to the state economy;
- explain the complexity of agriculture in Wisconsin;
- identify types of agricultural production in the state;
- determine Wisconsin's rank in the production of various agricultural commodities, such as dairy products, forage, and cash crops;
- discuss outlets and markets for Wisconsin farm products;
- examine the trends of sizes and number of farms in the county, state, and nation, and
- determine the national rankings of selected agricultural products.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Agriculturally related jobs [Social Studies]
  - Production
  - Agribusiness
  - Processors
  - Marketing
  - Transportation
  - Food service
  - Retailing
- Demographic changes [Social Studies]
  - Population migrations
  - Technological innovations

- World food producers [Social Studies]
  - North America
  - Europe
  - South America
  - Australia
  - Asia and Africa
  - Others
- Current trends [Career, Social Studies]
  - Production
  - Processing
  - Marketing
  - Per capita consumption
- Production in Wisconsin
  - Types of production and retail products
  - Percentage of total national production
  - County agricultural production comparisons

### *Motivational Activities*

- Take field trips to canning factories, livestock auctions, dairy processing plants, or other facilities using agricultural commodities.
- Invite guest speakers to address topics on agriculture production, agricultural careers, and consumer demands for agricultural products.
- Develop maps showing areas of agricultural production and of consumption of agricultural products.
- Develop charts and graphs depicting agricultural production in different parts of the United States and the world.

### *Learning Activities*

- Create bulletin board displays of the agricultural products imported to and exported from the United States.
- View films, videotapes, and slides of agricultural practices in different countries.

### *Instructional Materials*

#### **Textbooks and References**

*Fact Book of United States Agriculture* from the United States Department of Agriculture. Washington, DC: U.S. Government Printing Office, annual publication. Miscellaneous Publication Number 1063.

*Yearbook of Agriculture* from the United States Department of Agriculture. Washington, DC: U.S. Government Printing Office, annual publication.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- An Aggregative Analysis of the U.S. Farm Sector: Past Trends and Future Prospects.* R2733.
- Economic and Social Changes on Wisconsin Family Farms.* R3105.
- Highlights of the 1983 Wisconsin Family Farm Survey.* R3294.
- Rural Poverty in Wisconsin Counties.* R3331.

The following are available from the United States Department of Agriculture.

- Comparison of Agriculture in the United States and the European Community.* S/N001-019-00550-5.
- Dairy Production Research.* S/N001-000-04460-5.
- Livestock and Meat Statistics.* S/N001-019011369-3.
- United States Hog Industry.* S/N001-000-04408-7.
- World Food Needs and Availabilities.* S/N001-019-00480-1.

The following is available from the Wisconsin Department of Agriculture, Trade and Consumer Protection.

- Agricultural Statistics.* 200-89.

## Periodicals

- Agricultural Outlook*
- Farmline*

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

- U.S. Beef Supply/Demand Balance.* HS389.
- U.S. Corn Supply/Demand Balance.* HS226.
- U.S. Milk Supply/Demand Balance.* HS427.
- U.S. Pork Supply/Demand Balance.* HS367.
- U.S. Soybeans Supply/Demand Balance.* HS263.
- Wheat Analysis and Outlook.* HS255.
- World Food Grain Supply/Demand.* HS248.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

- American Farmer.* 00203 (16mm film, color, 19 minutes). Hearst Metrotone News, 1975.
- Food and Jobs: Wisconsin Agriculture.* 11370 (16mm film, color, 25 minutes) or 11627 (VHS videotape, color, 25 minutes). University of Wisconsin, Department of Agricultural Journalism, 1987.
- Food... For Man.* 02510 (16mm film, color, 19 minutes).
- Harvest.* 04557 (16mm film, color, eight minutes).
- Rewarding Careers in a Dynamic Industry - Agriculture.* 07409 (16mm film, color, 28 minutes).
- Two Farms: Hungary and Wisconsin.* 09554 (16mm film, color, 22 minutes).

## Marketing

This unit deals with marketing. Topics include career opportunities, history of marketing, types of marketable goods, market functions, supply and demand, market equilibrium, market costs, and marketing alternatives.

### Objectives

- To acquaint students with employment information and career opportunities in the area of marketing in agriculture
- To increase student awareness of the history of marketing in agriculture
- To acquaint students with basic marketing concepts and applications
- To increase student understanding of the dynamics of supply and demand and influencing factors
- To increase student understanding of the various elements of the marketing system in agriculture
- To develop student appreciation of the role and importance of marketing in agriculture

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the area of marketing in agriculture—and relate it to their personal needs and aspirations;
- describe several highlights in the history of marketing in agriculture;
- distinguish between the five categories of marketable goods and give examples of each;
- demonstrate familiarity with the major market functions;
- explain how major types of markets operate;
- demonstrate familiarity with basic concepts of supply and demand;
- identify several factors influencing supply and demand for agricultural commodities;
- demonstrate familiarity with costs associated with marketing agricultural products;
- explain and discuss the merits of alternative marketing methods; and
- list strategies for improving marketing of agricultural products.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Marketing history [Social Studies]
  - Early methods
  - Current marketing

- Types of marketable goods [Science]
  - Perishable
  - Nonperishable
  - Raw materials
  - Finished products
  - Recycled materials
- Major functions of a market [Careers, Social Studies]
  - Buying
  - Selling
  - Transportation and distribution
  - Processing and packaging
  - Standardization and grading
  - Financing
  - Risk
  - Information and advertising
- Major market types [Social Studies]
  - Auction
  - Direct
  - Consumer direct
  - Local buyers
  - Central
  - Commissioned
  - Contracted
  - Co-op pools
  - Commodity trading
  - Computer
- Effects of supply and demand on markets [Careers, Mathematics, Science, Social Studies]
  - Supply and demand curves
  - Elasticity of supply and demand
    - Elastic
    - Inelastic
    - Unitarian
- Factors that affect demand [Careers, Social Studies]
  - Number of consumers
  - Consumer tastes
  - Consumer income
  - Availability and price
  - Governmental influences
  - Imports and exports
  - Future conditions
- Factors that affect supply [Careers, Social Studies]
  - Number of sellers
  - Production costs
  - Technology



- Competitive goods
- Monopolies
- Governmental influences
- Future conditions
- Equilibrium in the market [Mathematics]
  - Price versus supply and demand
  - Cobweb theories
- Marketing costs [Careers, Mathematics, Social Studies]
  - Produce costs
    - Risk
    - Finance
    - Production costs
    - Transportation
    - Raw materials
    - Spoilage and shrinkage
  - Buyer costs
    - Transportation
    - Assembly
    - Standardization
    - Storage and holding
    - Risk
    - Finance
    - Spoilage and shrinkage
  - Processor or packer costs
    - Transportation
    - Processing
    - Grading and standardization
    - Selling
    - Holding and storage
    - Financing
    - Spoilage and shrinkage
  - Wholesaler costs
    - Processing
    - Transportation
    - Risk
    - Holding and storage
    - Merchandising
    - Spoilage and shrinkage
  - Retailer costs
    - Transportation
    - Risk
    - Holding and storage
    - Advertising
    - Spoilage and shrinkage

• Marketing alternatives [Careers, Mathematics, Social Studies]

- Marketing orders
  - Milk
  - Crops
  - Livestock
  - Advantages and disadvantages
- Contract marketing
  - Livestock
  - Crops
  - Milk
  - Advantages and disadvantages
- Options
  - Types
    - 1. premium
    - 2. call
    - 3. put
  - Reasons to option
    - 1. types
    - 2. futures prices
    - 3. dates of expiration
    - 4. strike prices
  - Advantages and disadvantages
- Hedging
  - Short hedges
  - Long hedges
  - Advantages and disadvantages
- Futures trading
  - Chicago and New York exchanges
  - Using futures in traditional marketing
  - Advantages and disadvantages
- Certificates of delivery
  - Defined
  - Types
  - Uses
  - Advantages and disadvantages
- Consignment of goods
  - Uses
  - Advantages and disadvantages
- Direct marketing
  - Uses
  - Advantages and disadvantages
- Component marketing
  - Uses
  - Advantages and disadvantages

• Improvements in marketing [Careers, Science, Social Studies]

- Producer education
- Research markets before production
- New products

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- Advertisement of products
- Improved quality of produced goods
- Expand exportation
- Consumer education

### *Motivational Activities*

- Take a field trip to a local auction market.
- Post bulletin board displays that show current market prices for various commodities.
- Obtain a computer hookup to access up-to-the-minute market prices.
- Invite a local businessperson to give a marketing presentation.
- Take a field trip to an area business to observe its marketing program.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Record weekly market prices for a particular commodity and plot them on a graph.
- Play a Monopoly-type game using commodities.
- Sell food items, such as oranges, bananas, and candy bars, at a classroom auction; keep track of the bids that each item brings to study supply and demand.

### *Instructional Materials*

#### Textbooks and References

- Fundamentals of Modern Marketing* by Ed Cundiff et al. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1985. Available from National Farm Book Company.
- Marketing Farm Products: Economic Analysis* by Geoffrey S. Shepherd and Gene A. Futrell. 7th ed. Ames, IA: Iowa State University Press, 1982. Available from National Farm Book Company.
- Marketing of Agricultural Products* by Richard L. Kohls and Joseph N. Uhl. 6th ed. New York: Macmillan, 1986. Available from National Farm Book Company.

#### Bulletins and Pamphlets

The following are available from the Chicago Mercantile Exchange.

*Livestock Hedgers Workbook*  
*Livestock Options*

The following are available from the Cooperative Extension Service.

- The Delicate Supply-Demand Balance.* A2972.
- How Parity Prices and Support Levels Are Determined.* A2974.
- The Milk Producer's Cost-Price Outlook for 1979.* A2976.
- Pricing Milk to Farmers on a Component Basis.* A2977.
- What Is a Federal Milk Marketing Order?* A2973.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Agricultural Marketing Principles*. AgDex 84.

#### Periodicals

*Agri-View*

*The Country Today*

#### Computer Software

The following is available from the American Association of Vocational Instructional Materials.

*Price Discount vs. Interest*

The following are available from the American Vocational Association.

*Job Hunters Survival Kit*. Apple.

The following are available from Hobar Publications.

*Agricultural Marketing Alternatives*. IBM.

*Agricultural Marketing and Commodity Futures*. Apple.

*Futures Account*. IBM.

*Grain Marketing*. Apple, IBM.

*Price Charting*. Apple.

The following is available from Vocational Education Productions.

*Ag Management Series*

#### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*About Profiting with Options*. FE9993

*Agriculture Marketing*. CSU296.

*Futures*. CSU298.

*Futures Market*. CSU299.

*Grain Market*. CSU302.

*Marketing Alternatives*. CSU297.

#### Films, Videotapes, and Slides

The following is available from the Instructional Materials Laboratory.

*Agricultural Marketing*. Ag-81-T (29 transparencies).

The following are available from Modern Talking Picture Service, Inc.

*The Consumer Connection*. 17728 (16mm film, color, 23 minutes).

*Trademarks: The Name Game*. 20345 (16mm film, color, 15 minutes). 1980.

The following are available from Nasco.

*Agricultural Cooperatives*. C10554N (Filmstrip with cassette).

*Agricultural Marketing*. C10556N (Filmstrip with cassette).

#### Equipment and Facilities

Computer/printer

## Meat Processing (10-20 days)

This unit deals with meat processing and its related industry. Topics include career opportunities, health and sanitation in meat processing, meat inspection, grades of market animals, slaughtering of market animals, and the wholesale and retail cuts of market animals.

### *Objectives*

- To acquaint students with employment information and career opportunities in the meat processing industry
- To provide students with opportunities to practice breed identification skills for common meat animals
- To inform students of the state and federal regulations of the meat processing industry
- To provide students with training in identifying wholesale and retail cuts and in grading meat carcasses
- To develop student understanding of the slaughter and butchering processes

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the meat-processing industry—and relate it to their personal needs and aspirations;
- distinguish breed characteristics of beef, pork, lamb, veal, and poultry;
- be aware of health and sanitation requirements in meat processing;
- describe the job functions of the state and federal meat inspectors;
- identify the parts of the different carcasses from market animals and poultry;
- list and describe all United States Department of Agriculture grades of market animals and poultry;
- list and discuss the techniques of slaughter of market animals;
- distinguish and name the retail meat cuts of market animals and poultry; and
- distinguish and name the wholesale meat cuts of market animals and poultry.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Breed Characteristics
  - Beef breeds

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- Pork breeds
- Sheep breeds
- Veal breeds
- Poultry
- Health and sanitation in meat processing [Science]
  - Health
  - Diseases and parasites of livestock and poultry
- Meat inspection [Social Studies]
  - Ante- and postmortem inspection
  - Labeling
  - Import and export inspection
- Market animal carcass identification [Science]
  - Beef and veal
  - Hog and lamb
  - Poultry
- Market animal grading [Social Studies]
  - Beef and veal grades
  - Pork and lamb grades
  - Poultry grades
- Market animal slaughtering
  - Rendering insensible
  - Shackling and hoisting
  - Sticking and bleeding
  - Scalding and skinning
  - Removing viscera
  - Splitting
  - Washing and shrouding
  - Cooling and storing
  - Wrapping
- Wholesale cuts [Social Studies]
  - Beef and veal
  - Pork and lamb
  - Poultry
- Retail cuts [Social Studies]
  - Beef and veal
  - Pork and lamb
  - Poultry
- Meat preservation processes
  - Canning
  - Smoking
  - Freezing

- Drying
- Salting
- Pickling

### *Motivational Activities*

- Take a field trip to a meat-processing plant or a supermarket with a meat-cutting department.
- Post bulletin board displays featuring topics related to this unit.
- Invite an owner of a meat-processing operation or a meat inspector to give a class presentation.
- View films, videotapes, and slides on meat processing.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Design a flow diagram of a meat-processing operation.
- Collect and display various canned and dried meat products.
- Determine freshness qualities of meat.
- Report on various areas of meat processing.
- Describe the steps involved in cutting, wrapping, and processing a carcass.
- Describe the steps involved in preserving meat products.
- Conduct taste tests for various processed and fresh meat cuts.

### *Instructional Materials*

#### **Textbooks and References**

- Basic Butchering of Livestock and Game* by John J. Mettler. Pownal, VT: Storey Communications, 1986. Available from National Farm Book Company.
- Developments in Meat Science* by R.A. Lawrie. New York: Elsevier Science Publishing, 1985.
- Home Book of Smoke Cooking Meat, Fish, and Game* by Raymond Hull and Jack Sleight. Harrisburg, PA: Stackpole Books, 1971.
- How to be Your Own Butcher* by Leon Stanley and Evan Lobel. New York: Putnam Publishing, 1983.
- Introduction to Food Processing* by Pavel Jelen. Reston, VA: Reston Publishing, 1985.
- Meat Evaluation Handbook*. Chicago: National Livestock and Meat Board, 1977.
- Meat, Poultry, and Seafood Technology* by Robert L. Henrickson. Englewood Cliffs, NJ: Prentice Hall, 1978.
- The Meat We Eat* by John R. Romans et al. 12th ed. Danville, IL: Interstate, 1985.
- Processed Meats* by A.M. Pearson and F. Warren Tauber. 2nd ed. New York: AVI Publishing, 1984.
- Raising a Calf for Beef* by Phyllis Hobson. Pownal, VT: Storey Communications, 1976. Available from Nasco.
- Raising Your Own Meat for Pennies a Day* by Will Graves. Pownal, VT: Storey Communications, 1983.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- After the Bird Shoot*. B2502.
- Facts about Processed Meats*. A3041.



*Lamb Slaughtering, Cutting, Preserving, and Cooking on the Farm.* AF2264.  
*Meat Yields from Beef, Pork and Lamb.* A2584.  
*Pork—Slaughtering, Cutting, Preserving and Cooking on the Farm.* AF2265.  
*So You Got a Deer.* G1598.

The following is available from the National Livestock and Meat Board.

*The Meat Board Guide to Identifying Meat Cuts.* 17-203.

#### Periodicals

*Meat and Poultry*  
*Meat Plant Magazine*  
*National Provisioner*

#### Computer Software

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Meats.* Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: Beef.* Apple.  
*Agri-ID: Sheep.* Apple.  
*Agri-ID: Swine.* Apple.

#### Laboratory Resources

The following are available from the National Livestock and Meat Board.

*Marketing Photographs.* 06-901 (Six color prints).  
Notebook Charts for Beef (06-406), Pork (06-407), and Lamb (06-408).

#### Films, Videotapes, and Slides

The following is available from Agri-Farm Publications.

*Beef Packing Plant Tour.* 5062 (VHS videotape, color).

The following is available from Nasco.

*Beef Yield Grading.* Z10951N (VHS videotape, 40 minutes).

The following are available from the National Livestock and Meat Board.

*Meat Evaluation Handbook Judging Slides.* 17-602 (95 color slides).  
*Meat Identification.* 17-601 (136 color slides).

The following are available from Vocational Education Productions.

*Lamb Retail Cuts Identification*. 6-040-113V2 (VHS videotape, 40 minutes).

#### Equipment and Facilities

Walk-in cooler  
Freezer  
Knives  
Saws (electric and hand)  
Lab coats  
Sharpening stones  
Steel  
Wrapping materials  
Hard hats  
Cleaning materials  
Meat grinders  
Sausage stuffer  
Cooking facilities  
Cooking utensils

## Metal Fabrication (15-45 days)

This unit deals with the metal fabrication industry. Topics include career opportunities, basic metallurgy, types of metal fabrication, mathematics used in metal fabrication, and welding.

### Objectives

- To acquaint students with employment information and career opportunities in the metal fabrication industry
- To emphasize to students the need to follow safety practices and procedures associated with all types of welding and metalwork
- To provide students with instruction and practice in identifying common metals
- To develop student understanding of how to prepare metal for welding
- To provide students with instruction on how to weld machinery and equipment in all positions
- To develop student ability to set up and adjust welders
- To prepare students to apply welding skills to jobs and projects
- To assist students with design and assembly of a laboratory project

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the metal fabrication industry—and relate it to their personal needs and aspirations;
- understand and apply good safety habits in the laboratory;
- identify different metals used in various metalworking processes;
- prepare metal for welding;
- use welding techniques on agricultural machinery and equipment;
- set up and adjust arc and gas welders;
- apply welding skills to jobs and projects; and
- design and assemble a shop project.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Welding
  - Definition

- Historical background
- Welding processes
- Metallurgy [Science]
  - Mechanical properties
  - Classifications of carbon steels
  - Alloy steels
  - Spark testing of metals
  - Effects of heat on metal
- Welding vocabulary
- Arc welding machines [Mathematics]
  - Electrical background information
  - Welding circuit
  - Arc welding equipment
    - Gloves
    - Helmets, shields, goggles
    - Cables, clamps
    - Ventilation systems
  - Electrodes
    - American Welding Society classification system
    - Amperage selection
    - Conserving and storing
  - Welding operations
    - Machine and laboratory setups
    - Striking an arc
    - Electrode angle
    - Arc length
    - Laying stringer beads
    - Padding
    - Safety
  - Welding types
    - Butt weld
    - Fillet weld
    - Corner weld
    - Lap weld
    - Groove weld
- Gas welding [Science]
  - Process description
  - Useable gases
  - Oxyacetylene equipment
    - Tanks
    - Regulators
    - Hoses
    - Torches
    - Welding tips
    - Spark lighter

- Welding goggles
  - Setup of welding outfit
  - Lighting torch and flame adjustments
  - Flame types
  - Torch shutdown
  - Welding processes
    - Carrying a puddle
    - Beads with a rod
    - Flange weld
    - Brazing
    - Flame cutting
  - Gas welding safety
- Welding positions
  - Horizontal
  - Vertical
  - Overhead
  - Protective cautions
- Cast-iron welding [Science]
  - Process description
  - Electrode types
  - Metal identification
  - Metal preparation
  - Welding techniques
  - Controlled cooling
- Thick section welding
  - Metal preparation
  - Welding technique
- Metallic arc welding [Science]
  - Process description
  - Machine setup
  - Welder operation
  - Machine maintenance
- Gas tungsten inert welding
  - Process description
  - Machine setup
  - Welder operation
  - Machine maintenance
- Product planning [Mathematics]
  - Ideas for product design
  - Working drawings
  - Bill of materials and procurement

### *Motivational Activities*

- Take a field trip to a welding repair shop, a welder manufacturer, or a factory that has an on-site welding operation.
- Post bulletin board displays featuring topics on welding.
- View films, filmstrips, and videotapes about welding.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Identify and run beads made with a short arc, long arc, high amperage, and low amperage.
- Weld metals of different thicknesses in the flat, horizontal, and vertical position.
- Construct welding projects.
- Identify common metals using a spark test.
- Weld pipe in any axis.
- Remove a nut from a rusted bolt.
- Collect, label, and display specimens of steels and steel alloys and identify the electrodes to use with them.
- Perform brazing exercises on different metals and alloys.
- Demonstrate a 60-degree groove joint exercise.
- Complete a lap on a "T" joint on metal 3/16" or less in thickness.
- Repair a broken piece of agricultural equipment, agricultural machinery, or hard-surface worn machine and equipment parts.

### *Instructional Materials*

#### *Textbooks and References*

- General Metals* by John L. Feirer. 5th ed. New York: McGraw-Hill, 1980.
- Mechanics in Agriculture* by Lloyd J. Phipps. 3rd ed. Danville, IL: Interstate, 1983.
- Metals and How to Weld Them* by Theodore B. Jefferson and Gorham Woods. 2nd ed. Cleveland: James F. Lincoln Arc Welding Foundation, 1972.
- Metals Handbook*. 11 vols. Metals Park, OH: American Society for Metals International, 1983.
- Modern Welding* by Andrew D. Athouse and Carl H. Turnquist. South Holland, IL: Goodheart-Willcox, 1984.
- The Oxyacetylene Handbook*. New York: Linde Division, Union Carbide, 1976.
- The Oxyacetylene Welders' Handbook* by Theodore B. Jefferson. 7th ed. Lake Zurich, IL: Jefferson Publishing, 1972.
- Print Reading for Welders* by J. W. Giachino and H. J. Baukema. 2nd ed. Homewood, IL: American Technical Publishing, 1978.
- Procedure Handbook of Arc Welding*. 12th ed. Cleveland: James F. Lincoln Arc Welding Foundation, n.d.
- Welding Handbook*. 6 vols. 6th ed. Metals Park, OH: American Society of Metals International, 1982.
- Welding Practices and Procedures* by Richard H. Carr and Robert L. O'Con. Englewood Cliffs, NJ: Prentice Hall, 1983.

## Bulletins and Pamphlets

The following is available from Airco Welding Products.

*Recommended Safe Practices in Welding and Cutting*

The following is available from Allstate.

*Instruction Manual and Catalogue*

The following is available from the American Welding Society.

*Safety in Welding and Cutting*. AN51Z49.1.

The following are available from Handy and Harman.

*The Brazing Book*. 1980.

*Fundamentals of Silver Brazing*. Bulletin 666.

The following is available from Hobart Brothers Technical School.

*Recommendations for Teaching Welding*

The following are available from James F. Lincoln Arc Welding Foundation.

*Aids to Excellent Machine Design in Welded Steel*

*Arc Welding—Basic Manual of Instruction*

The following are available from Union Carbide Corporation.

*How to Do Heliarc Welding of Pipe*

*How to Do TIG Welding*

*Linde Gases and Welding Products*

*Oxyacetylene Welding and Cutting for the Beginner*

*Precautions and Safe Practices for Welding and Cutting*. Form 52529.

The following is available from the Miller Electric Manufacturing Company.

*Principles of Arc Welding*

The following is available from the Stellite Division.

*Stellite Hard Facing Products*

The following is available from the Stoddy Company.

*Stoddy Farm Hard-surfacing Handbook*

The following are available from Vocational Agriculture Services.

*Metal Inert Gas (MIG) Welding.* U3037.  
*Oxyacetylene Welding and Cutting.* U3001a.  
*Safety in the Shop.* U3022a.  
*Shielded Metal-Arc Welding.* U3004a.  
*Tungsten Inert Gas (TIG) Welding.* U3036a.

#### Periodicals

*Applied Science and Technology Index*  
*Welding-Brazing-Soldering Digest*  
*Welding Design and Fabrication*  
*Welding Journal*

#### Computer Software

The following are available from Hobar Publications.

*Arc Welding.* Apple, IBM.  
*Arc Welding and Related Review.* Apple, IBM, TRS, Commodore, Macintosh.  
*Oxyacetylene and Related Review.* Apple, IBM, TRS, Commodore, Macintosh.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Welding.* Apple, IBM.

The following is available from Hobar Publications.

*Vocational Competency Management Program: Metals.* Apple, IBM.  
*Welding Electrodes Identification.* Apple.  
*Welding Equipment Safety and Operations.* Apple, IBM, TRS.

#### Laboratory Resources

The following is available from American Technical Publishers, Inc.

*Welding Skills and Practices.* 1985.

The following is available from Hobar Publications.

*Metals and Welding.* 170 (Manual). 1987.

The following is available from Vector Publications.

*Arc Welding: A Self-Instruction Guide.* Volumes I and II. 1967.



## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Arc Welding Methods*. 08516 (16mm film, color, 27 minutes). Miller Electric Manufacturing, 1972.  
*Fundamentals of Manual Shielded Arc Welding Techniques*. 03979 (16mm film, color, 44 minutes). Airco Welding, 1971.  
*Short Circuiting Metal Transfer—A Gas Metal Arc Welding Process*. 08308 (16mm film, color, 25 minutes). Miller Electric Manufacturing, 1974.

The following are available from Teaching Aids, Inc.

*Arc Welding*. P-0963 (Five filmstrips with cassettes, instructor's guide, and reproducible masters).  
*Welding Safety*. B-515 (Two filmstrips with cassettes and study guides).

The following are available from Vocational Agriculture Services.

*Care and Maintenance of Arc Welding Equipment*. F470 (56-frame filmstrip).  
*Equipment Safe Practices*. F455a (93-frame filmstrip).  
*Equipment Setting Up*. F456a (57-frame filmstrip).  
*Lighting and Adjusting the Flame*. F471 (42-frame filmstrip).

The following are available from Vocational Education Productions.

*Basic Arc Welding Safety*. 6-047-100V2 (VHS videotape, 10 minutes).  
*Welding*. 6-066-123V2 (VHS videotape).

The following are available from Vocational Media Associates.

*Arc Welding*. 30987-93 (Five-part filmstrip with program guide).  
*Welding Vocabulary Skills*. 31065-93 (Three-part filmstrip with program guide).

## Equipment and Facilities

Alternating current, direct current, and automatic welders  
Oxyacetylene tanks and setups  
220-volt wiring in shop  
Ventilation system

## Natural Resources (90 days)

This unit deals with natural resources and management practices. Topics include career opportunities, historical background, philosophy, definitions, multiple uses of natural resources, ecology, wildlife management, water resources, and air pollution.

### *Objectives*

- To acquaint students with employment information and career opportunities in the natural resources area
- To develop student awareness of the history of natural resource issues and practices
- To give students opportunities to critically examine various conservation philosophies
- To develop student understanding of the range, value, and uses of natural resources
- To help students identify ways to conserve and develop natural resources and human resources
- To assist students in applying the basic principles of conservation to local natural resources
- To increase student awareness of how and why conflicts arise over the use of natural resources and facilitate student inquiry into resolution of conflicts
- To enhance student appreciation and understanding of the complex relationships between living organisms and the environment

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the conservation and natural resources industry—and relate it to their personal needs and aspirations;
- identify and review the history of environmental movement;
- describe a personal conservation philosophy and compare it with alternative views;
- analyze and evaluate the conservation philosophy of local, state, and national leaders and organizations;
- identify the various categories of natural resources and list conservation methods;
- describe conflicts involved with multiple uses of selected local natural resources;
- describe the reciprocal relationships between a living organism and its environment;
- distinguish between a biotic and abiotic environment;
- visualize specific examples of interspecific and intraspecific environmental factors; and
- describe the "community concept" and list living members of local environments.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current employment information
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- Developing a conservation philosophy
  - Conservation versus preservation
  - Natural resources
    - Renewable
    - Nonrenewable
  - Human resources
- Land settlement in the United States [Social Studies]
  - Indians versus settlers
    - Land ethic
    - Forests
    - Wildlife
  - Government involvement
  - Private business
    - Strip-mining—1852
    - Grazing—1800s
    - Prairie dust bowls—1880s
  - Environmental leaders
  - Resource management methods
    - Preservation
    - Recycling
    - Harvest
  - Multiple-use concept
    - Forest
    - Timber
    - Livestock
    - Recreation
    - Flood protection
- Ecology [Science]
  - Definition
    - Abiotic
    - Biotic
  - Habitat
    - Limiting factors
    - Carrying capacity
  - Food pyramids
    - Energy pyramids
    - Trophic levels
      1. herbivores
      2. omnivores
      3. carnivores
      4. scavengers
      5. decomposers

- Food webs
  - Species interrelationships
  - Effects of population
  - Introduction of new species or exotics
- Wildlife management [Mathematics, Science]
  - Population inventory of fish and game
    - Census
    - Production rate
    - Methods to determine populations
  - Population dynamics
    - Predators
    - Overpopulation
    - Disease and parasites
    - Cyclic population
  - Improvement
    - Restoration methods
    - Good land use practices
      1. plant succession systems
      2. plantings
      3. shoreline reconstruction
      4. shelters
      5. ditching
      6. ponds, reservoirs, and lakes
      7. marshland improvements
      8. prescribed burning
      9. edge habitat construction
  - Restoration
    - Stocking fish
    - Reintroduction of extirpated species
    - Not a substitute for good habitat or management
    - New species
  - Research and education
- Water resources [Science]
  - Hydrologic cycle
  - World supply
  - Use of water
    - Agricultural
    - Industrial
    - Residential and commercial
  - Household uses
    - Toilet
    - Bathing
    - Laundry
    - Kitchen
    - Other

- Water quality measures
  - Coliform index
  - Dissolved oxygen (DO)
  - Biochemical oxygen demand (BOD)
  - Phosphates
- Types of water pollution
  - Thermal
  - Point
  - Nonpoint
  - Nutrient
  - Industrial
- Wastewater treatment plants
  - Combined versus uncombined
  - Primary
  - Secondary
  - Tertiary
- Septic tank systems
  - Percolation tests
  - Types and installation
    1. conventional
    2. mound
- Air pollution [Science]
  - Definition
  - Major sources
    - Transportation
    - Stationary fuel consumption
    - Industrial processes
    - Forest fires
    - Miscellaneous
  - Major contaminants
    - Carbon monoxide
    - Hydrocarbons
    - Sulfur oxides
    - Particulates
    - Nitrogen oxides
  - Local sources, effects, recent changes
  - Worldwide trends
    - Greenhouse effect
    - Cooling effect
  - Temperature inversions
  - Managing and controlling air pollutants
  - Acid rain
- Other areas of study [Science, Social Studies]
  - Pesticides
  - Outdoor recreation
  - Land-use planning
  - Environmental ethics

- Politics and conservation decisions
- Energy and mineral resources
- Fish and wildlife management
- Forestry
- Soil conservation

### *Motivational Activities*

- Take field trips to a bog, marsh, prairie, forest, clean water source, polluted lake or stream, feedlot, recycling operation, water treatment plant, city landfill, game farm, fish farm, a wildlife preserve or refuge.
- Invite resource speakers from the Department of Natural Resources, Soil Conservation Service, water or soil testing laboratory, or U.S. Forest Service to give a class presentation.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program related to natural resource management.
- Create charts of food levels using species from communities visited on field trips.
- Develop a priority list for local resources.
- Develop a plan to combat local pollution problems.
- Design a layout for a campground.
- Develop an environmental impact statement for a local building project.
- Study the history of Wisconsin deer harvests.

### *Instructional Materials*

#### **Textbooks and References**

- Environmental Conservation* by Raymond Frederick Dasmann. 5th ed. New York: John Wiley and Sons, 1984. Available from National Farm Book Company.
- Environmental Science* by P.W. Purdom and S.H. Anderson. 2nd ed. Columbus, OH: Merrill Publishing, 1983.
- Indian History Guides*. Set of 12 guides, item number 6474-85. Madison, WI: Department of Public Instruction, 1988.
- Managing our Natural Resources* By William G. Camp and Thomas B. Daugherty. Albany, NY: Delmar, 1988.
- Our Natural Resources and Their Conservation* by Harry B. Kircher, Donald L. Wallace, and Dorothy Gore. 6th ed. Danville, IL: Interstate, 1981.
- Sand County Almanac* by Aldo Leopold. Sierra Club/Ballantine, 1966.
- Silent Spring* by Rachel Carson. Boston, MA: Houghton Mifflin, 1962.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Acid Rain: Impact on Aquatic Organisms Other Than Fish*. G3305-5.
- Bear Damage and Nuisance Problems in Wisconsin*. G3300.
- The Benefits of Well-Managed Stream Corridors*. G3404.

*The Lake in Your Community*. G3216.  
*Land Use and Groundwater Quality in the Central Wisconsin Sand and Gravel Aquifer*. G3335.  
*Nonpoint Pollution: Causes and Consequences*. G2956.  
*Nonpoint Source Pollution: Land Use and Water Quality*. G3025.  
*Perspectives on Tomorrow: Food-Population-Resources; the Issues and the Options*. NCR53.  
*Solid Waste Disposal*. G2854.  
*Wisconsin's Sensitivity to Acid Rain: The Role of Geologic Materials and Soils*. G3305-3.

The following are available from the Wisconsin Department of Natural Resources.

*Wildlife, People and the Land*. 621.  
*Wisconsin Endangered and Threatened Species Field List*  
*Wisconsin Fishing*. 25-3600.  
*Working for Clear Water: An Introduction to the Wisconsin Water Quality Management Program*

#### Periodicals

*Audubon Magazine*  
*Conservation*  
*Conservation Education*  
*Conservationist*  
*International Wildlife*  
*National Wildlife*  
*Nature Conservancy Magazine*  
*Sierra*  
*Vision* (formerly *Keep America Beautiful*)  
*Wisconsin Natural Resources*

#### Computer Software

The following are available from Hobar Publications.

*Fish and Wildlife of the Upper Midwest and Related Review*. Apple, IBM, TRS, Macintosh.  
*Forestry and Related Review*. Apple, IBM, TRS, Macintosh.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Leaf*. Apple.  
*Agri-ID: The Plant*. Apple.  
*Agri-Quiz: Forestry*. Apple, IBM.  
*Agri-Quiz: Soils*. Apple, IBM.

#### Laboratory Resources

The following is available from Interstate Printers and Publishers, Inc.

*Investigations in Conservation of Natural Resources* by Harry B. Kircher and R.A. Lytle. (Companion workbook.)

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

- Lake Renewal Techniques.* 09473 (16mm film, color, 23 minutes). University of Wisconsin, Department of Agricultural Journalism, 1974.  
*Nonpoint '83.* 01832 (16mm film, color, 28 minutes). National Association Conservation Distributor, 1977.  
*Of People, Land and Planning.* 09526 (16mm film, color, 26 minutes). University of Wisconsin, Department of Agricultural Journalism, 1975.  
*Recycling.* 03979 (16mm film, color, 11 minutes). Journal Films, 1971.  
*Story of Two Creeks.* 08704 (16mm film, color, 27 minutes) or 12052 (VHS videotape, color, 27 minutes). University of Wisconsin, Department of Geology, 1969.  
*Wisconsin's Air.* 09326 (16mm film, color, 27 minutes) or 11600 (VHS videotape, color, 27 minutes). University of Wisconsin, Department of Agricultural Journalism, 1974.

The following are available from Forest Service Films.

- Forests for Wildlife.* (16mm film, 15 minutes.) 1978.  
*Think Like a Mountain.* (16mm film, 28 minutes.) Audience Planners, 1972.

The following are available from Nasco.

- Managing Wildlife.* C10425N (Color filmstrip with cassette and script).  
*Soil and Agricultural Environment.* C10441N (47-frame color filmstrip with cassette and script).

The following are available from the Public Broadcasting Service.

- Acid Rain*  
*Fish and Wildlife Management.* 3M.  
*Queen of the Pinery*  
*Wild America Series.* Marty Stouffer Productions.



## Ornamental Nursery Management (45-60 days)

This unit deals with ornamental nursery management. Topics include careers opportunities, business management, propagation, container growing, field growing, and pruning.

### Objectives

- To acquaint students with employment information and career opportunities in the ornamental nursery industry
- To provide students with a basic understanding about business management of the nursery industry
- To familiarize students with important plant growth factors associated in a nursery
- To acquaint students with methods to propagate plants in the nursery
- To provide students with information on types of vegetative propagation
- To inform students of basic techniques in growing woody ornamental plants
- To create student awareness of the benefits and techniques of pruning ornamental plants
- To acquaint students with the art of topiary

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the ornamental nursery industry—and relate it to their personal needs and aspirations;
- demonstrate knowledge of the business management of a nursery;
- differentiate between indirect and direct seeding methods;
- prepare a media for seeds, sow and germinate seeds, and grow seedlings;
- transplant seedlings into pots or flats;
- demonstrate softwood, semihard wood, and hard wood cuttings;
- demonstrate leaf and mallet cuttings;
- demonstrate knowledge of the budding process;
- demonstrate simple and air layering;
- grow liners from cuttings and transplant and maintain them in containers;
- demonstrate knowledge of balling and burlapping;
- describe and demonstrate types of pruning procedures noting time and techniques; and
- design and construct a topiary project.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- Scope of nursery industry [Careers, Mathematics, Social Studies]
  - Services performed
  - Job-entry skills
  - Workers traits and titles
- Nursery industry management [Careers, Mathematics, Social Studies]
  - Labor availability
  - Equipment and supplies
  - Marketing
- Seed types [Science]
  - Monocot structure
  - Dicot structure
- Direct and indirect seeding [Science]
  - Germination media
  - Differences
- Seed media [Mathematics, Science]
  - Cornell mix
  - Growing media for ornamental plants
  - Germination
  - Records
  - Information from seed packets
  - Growth requirements
  - Watering, fertilizing, and maintaining seedlings
  - Fertilizing
- Transplanting [Science]
  - Procedures
  - Potting
- Semihard cuttings [Science]
  - Procedure
  - Vegetative propagation log
- Softwood cuttings [Science]
- Leaf cuttings and mallet cuttings [Science]
- Root cutting [Science]
- Hardwood cuttings [Science]
  - Keeping logs
  - Pests and disease problems

- Propagate by separation and division [Science]
- Grafting techniques [Science]
  - Procedures
  - Techniques in budding and grafting
- Budding process [Science]
- Layering [Science]
  - Simple
  - Air
  - Other methods
  - Procedures
- Growing container plants [Science, Social Studies]
  - Liners from cuttings
  - Transplanting
  - Maintaining in containers
  - Production of nursery stock
- Advantages of field-grown plants [Science]
- Balling and burlapping [Science]
  - Practice
  - Machine digging versus hand digging
  - Bare root
- Pruning [Science]
  - Types
  - Procedures
  - Hands-on experience
  - Pruning deciduous trees
  - Pruning landscape ornamentals
- Pruning angle [Science]
- Pruning timing [Mathematics, Science, Social Studies]
  - Flowering trees
  - Evergreens
- Pruning techniques [Science]
  - Spring flowering shrubs
  - Summer flowering shrubs
  - Broadleaf evergreens
  - Conifers

### *Motivational Activities*

- Take field trips to established nurseries.
- Invite resource speakers to give class presentations on new developments in the industry, such as plant patents, automation, new equipment, chemicals, tissue cultures, and computers.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Complete a job survey form.
- Prepare a chart listing parts and functions of plants seeds.
- Make a model of a seed.
- Transplant a seedling.
- Complete plant cuttings.
- Construct a topiary display for the school.

### *Instructional Materials*

#### **Textbooks and References**

- Introductory Horticulture* by H. Edward Reiley and Carroll L. Shry. 2nd ed. Albany, NY: Delmar, 1983.
- Nursery Crops and Landscape Designs for Agribusiness Studies* by George S. Williams. Danville, IL: Interstate, 1984.
- The Nursery Worker*. Columbus, OH: Ohio Agricultural Education Curriculum Materials Service, 1984.
- Ornamental Horticulture Source Units for Vocational Teachers* by Paul E. Hemp. Danville, IL: Interstate, 1968.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Common Foliage Diseases of Shade Trees in Wisconsin*. A2509.
- Deciduous Tree Disorder: Cankerworms*. A3178.
- Deciduous Trees Disorder: Miscellaneous Causes of Decline*. A2414.
- Evergreens—Planting and Care*. A1730.
- Flowering Fruit Tree Disorder: Eastern Tent Caterpillar*. A2933.
- Growing Ornamentals in Urban Gardens*. AG188.
- Maple (Acer) and Other Trees and Shrubs Disorder: Verticillium Wilt*. A2537.
- Pruning Standard Apple Trees*. A1959.

#### **Periodicals**

- American Nurseryman*  
*Nursery Manager*  
*Pacific Coast Nurseryman and Garden Supply Dealer*

## Computer Software

The following are available from Mid States Agri-Technology Associates, Inc.

*Micro-Tutor: Basic Horticulture I.* Apple, IBM.  
*Micro-Tutor: Basic Horticulture II.* Apple, IBM.  
*Micro-Tutor: Deciduous Shrubs I.* Apple, IBM.  
*Micro-Tutor: Deciduous Shrubs II.* Apple, IBM.  
*Micro-Tutor: Deciduous Shrubs III.* Apple, IBM.  
*Micro-Tutor: Deciduous Shrubs IV.* Apple, IBM.  
*Micro-Tutor: Deciduous Trees I.* Apple, IBM.  
*Micro-Tutor: Deciduous Trees II.* Apple, IBM.  
*Micro-Tutor: Deciduous Trees III.* Apple, IBM.  
*Micro-Tutor: Deciduous Trees IV.* Apple, IBM.

## Laboratory Resources

The following is available from Animal Creations, Living Plant Sculpture and Topiary Craft Structure.

### Topiary Kits

## Films, Videotapes, and Slides

The following are available from Nasco.

*Budding and Grafting.* C10433N (61-frame color filmstrip with cassette and script).  
*Careers in Ornamental Horticulture.* C10267N (50-frame color filmstrip with cassette).  
*Controlling Pests of Ornamental Plants.* C10431N (Color filmstrip with cassette and script).  
*Identification of Trees.* C10177N (Three color filmstrips, 120 frames).  
*Major Pruning Trees.* C10569N (53-frame color filmstrip).  
*Propagation of Deciduous Shrubs for Nursery Production.* C10513N (39-frame color filmstrip).  
*Propagation of Evergreens for Nursery Production.* C10512N (58-frame color filmstrip).  
*Pruning Orchard Trees.* C10104N (41-frame color filmstrip).  
*Trees of America.* C10170N (83 color slides with script).

## Equipment and Facilities

|                                            |                |
|--------------------------------------------|----------------|
| Shovels, spades                            | Soil           |
| Land availability for nursery              | Vermiculite    |
| Pruning saws, shears                       | Sphagnum moss  |
| Microcomputer                              | Fertilizers    |
| Greenhouse, growth chamber, or plant stand | Plant hormones |
| Pots                                       | Perlite        |
| Flats                                      | Seeds          |

## Parliamentary Procedure (8-20 days)

This unit deals with the conduct of meetings and the proper use of parliamentary terms. The use of simulated meetings also shall be used to give students hands-on experience.

### *Objectives*

- To assist students in comprehending a need for a procedure that enables the business of an organization to be transacted in an orderly and effective manner
- To familiarize students with the accepted language that will enable them to participate effectively in a meeting.
- To help students distinguish between the various types of motions and their proper use to include the order of precedence
- To acquaint students with the components included in a business meeting agenda and the order in which they should be addressed
- To help students to identify parliamentary terms and assist them in properly using the terms at a meeting

### *Competencies*

At the conclusion of this unit, students will be able to

- explain the purpose of rules governing how meetings and public debates are conducted;
- list the officers of an organization and their duties;
- prepare an agenda for a meeting;
- call a meeting to order;
- introduce a motion as an item of business;
- amend a main motion;
- refer an item of business to a committee;
- stop or limit debate;
- postpone indefinitely and definitely;
- move the previous question;
- lay and take an item of business on the table;
- call for a point of order;
- demonstrate an appeal from the decision of the chair;
- demonstrate how to withdraw a motion;
- use a parliamentary procedure to inquire or request for information;
- call for a division of the house;
- demonstrate how to ask for a suspension of the rules;
- rise to a question of privilege;
- demonstrate the proper way to reconsider a motion;
- rescind a motion passed at an earlier meeting; and
- adjourn a meeting.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- The role of parliamentary procedure in the conduct of meetings
  - Purpose
  - Need for establishing a procedure for the conduct of meetings
    - Members know what to expect
    - Greater number of participants

Important items are not overlooked

- Types of motions and their rank according to precedence
  - Privileged motions
  - Incidental motions
  - Subsidiary motions
  - Principal motions
  - Motions that bring a question before the assembly again
- Agenda
  - Call to order
  - Opening ceremony
  - Roll call or announcement of attendance
  - Officer reports
    - 1. secretary's report
    - 2. treasurer's report
    - 3. other officer's report
    - 4. committee reports
  - Unfinished business
  - New business
  - Closing ceremony
  - Adjournment
  - Recreation and refreshments

● Parliamentary terms [Careers]

- Adhere
- Adjourned
- Adopt
- Agenda
- Ballot
- Bylaws
- Committee
- Dilatory motion
- Ex-officio
- General consent
- Germane
- Indecorum
- Main motion
- Majority
- Majority vote
- Meeting
- Member
- Minutes
- Motion
- New business
- Parliamentary procedure
- Pending question
- Plurality vote
- Precedence
- Prevailing side
- Previous notice
- Pro tem
- Putting the question
- Question
- Quorum
- Roll call vote

- Rules of order
- Session
- Special committee
- Standing committee
- Standing rules
- Unfinished business
- Vote
- Yield

● Parliamentary procedure exercises [Careers]

- Officers and their duties
- Procedure for selecting officers
- Proper use of the gavel
- Assuming the position of the chair
- Proper procedure for obtaining the floor
- The types and purposes of typical motions

Ranking motions

1. privileged motions
  - fix the time in which to adjourn
  - adjourn
  - recess
  - raise a question of privilege
  - call for the orders of the day
2. subsidiary motions
  - lay on the table
  - previous question
  - reduce or extend limits of debate
  - postpone to a certain time
  - amend
  - postpone indefinitely
3. main motions

Nonranking motions

1. incidental motions
  - point of order
  - appeal
  - suspend the rules
  - object to the consideration of a question
  - division of the assembly
  - division of a question
  - method of nominating or voting
  - nominations
  - point of information
  - parliamentary inquiry
2. unclassified
  - take from the table
  - reconsider
  - rescind
  - ratify



## *Motivational Activities*

- Arrange for the class to attend business meetings of agricultural or civic organizations.
- Develop bulletin board displays featuring topics related to this unit.
- Organize a mini-FFA chapter in class.
- Invite resource people to discuss officers' responsibilities within organizations.
- View films, videotapes, and slides on unit-related topics.
- Role-play officers in an annual meeting.

## *Learning Activities*

- Compile a list of parliamentary terms, their definition, and how each is used.
- Serve as a chairperson in a simulated meeting.
- Prepare a written report of a committee meeting.
- Deliver an oral report of a committee meeting.
- Record minutes of a meeting and submit them to class members for evaluation.
- Compile a list of local business organizations, their offices, and the duties associated with each office.
- Introduce items of business and participate in debate during simulated meetings.
- Take part in team competition within the classroom.
- Practice answering parliamentary questions on computer.

## *Instructional Materials*

### **Textbooks and References**

- Basic Lessons for Parliamentary Procedure* by Gary Leske and Brian Ingvalson. 2nd ed. Forest Lake, MN: Karen Ann Publishing, 1978.
- A Guide to Parliamentary Practices* by Melvin Henderson and Herbert J. Rucker. Danville, IL: Interstate, n.d.
- The How in Parliamentary Procedure* by Kenneth L. Russell. Danville, IL: Interstate, 1981. Available from National Farm Book Company.
- Leadership Training and Parliamentary Procedure for FFA* by Jarrell D. Gray and J. R. Jackson. Engelwood Cliffs, NJ: Prentice Hall, 1958.
- Official FFA Manual*. Alexandria, VA: Future Farmers of America, 1988. Available from National FFA Supply Service.
- Parliamentary Procedure for the FFA Member* by Harold Joestgen. Madison, WI: Department of Public Instruction, 1978.
- Robert's Rules of Order* by Henry M. Robert. Danville, IL: Interstate, 1981.
- Sturgis Standard Code of Parliamentary Procedure* by Alice Fleenor Sturgis. 2nd ed. New York: McGraw-Hill, 1966.
- When You Preside* by John D. Lawson. 5th ed. Danville, IL: Interstate, 1980.

### **Bulletins and Pamphlets**

The following is available from National Farm Book Company.

*Parliamentary Law at a Glance* by E.C. Utter. 1949.

### **Periodicals**

*FFA New Horizons* (formerly *The National Future Farmer*)

## **Computer Software**

The following is available from Hobar Publications.

*Parliamentary Procedure and FFA Review.* Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Conduct of Meeting.* Apple.

*Agri-Quiz: Parliamentary Procedure, Part I.* Apple.

*Agri-Quiz: Parliamentary Procedure, Part II.* Apple.

The following is available from Photocom.

*Micro-Tutor: Parliamentary Procedure.* Apple, IBM.

## **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Parliamentary Procedure.* CSU221.

*Parliamentary Procedure (DIR).* CLF520.

*Parliamentary Terms.* CSU222.

## **Films, Videotapes, and Slides**

The following is available from the Bureau of Audio Visual Instruction.

*Parliamentary Procedures in Action.* 01627 (16mm film, black and white, 16 minutes). Coronet, 1965.

The following are available from Midwest Agribusiness Services, Inc.

*Parliamentary Procedure Contest.* (VHS videotape, 24 minutes)

*Parliamentary Procedure in Review.* (VHS videotape, 57 minutes)

## Pasture Management (5-10 days)

This unit deals with establishing and managing pasture crops. Topics include career opportunities; pasture establishment, management practices, and problems; and harvesting methods.

### *Objectives*

- To acquaint students with employment information and career opportunities in pasture management
- To improve student understanding of forage pasture establishment
- To increase student understanding of pasture harvesting practices
- To help students develop a working knowledge of pasture management techniques
- To increase student awareness of problems associated with pastureland

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in pasture management—and relate it to their personal needs and aspirations;
- discuss the importance of pasture and pasture forage crops;
- list and discuss advantages of a pasture;
- compare common pasture forages;
- evaluate common pasture crops found in Wisconsin;
- contrast methods of harvesting pastures;
- select the correct pasture crop for a given situation;
- choose the practices necessary for establishing a pasture;
- describe the necessary steps in pasture renovation;
- explain practices that reduce losses from winterkill;
- summarize three causes of nitrate poisoning; and
- recall precautions that must be taken to prevent bloat on pastures.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Establishing forages for pastures [Mathematics, Science, Social Studies]
  - Preparing seedbeds
    - Rotating crops
    - Renovating permanent pastures
  - Selecting plant varieties
  - Applying lime and fertilizers
  - Setting production goals
  - Costs and benefits of pastures
  - Labor requirements
- Methods of harvesting pastures
  - Grazing
    - Rotational
    - Strip
    - Continuous
  - Green chopping
  - Stored feeding
- Management practices and problems [Science]
  - Burning
  - Mowing
  - Bloat control
  - Drought
  - Winterkill
  - Poisonous plants
  - Nitrate poisoning
  - Insects
  - Disease
  - Fencing options

### *Motivational Activities*

- Take a field trip to view farm pastures, test plots, and renovated pastures.
- Post bulletin board displays featuring topics related to this unit.
- View films, slides, and videotapes on pasture management.
- Display several types of fences.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Renovate a small portion of a field into a pasture.
- Collect and prepare a display of seeds of pasture plants.
- Prepare mounts of insects and diseases that damage pasture plants.
- Prepare displays and graphs depicting economics of good pasture management.
- Examine nutrient analysis for different pasture forages.
- Prepare charts and displays on poisonous plants, nitrate poisoning, and bloat.
- Develop a pasture improvement system.

## ***Instructional Materials***

### **Textbooks and References**

*Approved Practices in Pasture Management* by Don W. Graffs. 4th ed. Danville, IL: Interstate, 1985.  
*Crop Production* by Richard Delorit and Louis Grueb. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.  
*Forage Management* by Dale Smith et al. 5th ed. Dubuque, IA: Kendall/Hunt, 1986. Available from National Farm Book Company.  
*Profitable Pasture Management* by Roy A. Chessmore. Danville, IL: Interstate, 1979.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Animal Response to Energy Supplementation on Grass and Grass-Legume Pastures.* R3295.  
*Forage and Small Grain Pest Management in Wisconsin.* A1981.  
*Pasture Lease.* NCR109.  
*Pasture Rental Arrangements for Your Farm.* NCR149.  
*Put Power in Your Pasture with Nitrogen.* A2368.  
*Supplementary and Emergency Forage Crops.* A1119.  
*Winter Injury to Forages.* A2905.

### **Periodicals**

*Wisconsin Agriculturist*  
*Wisconsin Forager*

### **Computer Software**

The following is available from Cherrygrath Farms Software, Inc.

*Hay/Pasture Production.* Apple.

The following is available from Hobar Publications.

*Grasses and Legumes and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Mid States Agri-Technology Associates Ltd.

*Micro-Tutor: Forage Production.* Apple, IBM.

### **Films, Videotapes, and Slides**

The following are available from Hobar Publications.

*Crop, Hay and Silage Judging.* D3 (53 slides with cassette, 19 minutes).  
*Legume Crops.* D26 (115 slides).

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Diseases of Alfalfa*. AGDEX 113X (42-frame color filmstrip with script). 1978.

*Diseases of Clover*. AGDEX 114X (40-frame color filmstrip with script). 1978.

## Pesticide Technology (5-12 days)

This unit deals with the common agricultural pests and pesticides. Topics include career opportunities, agricultural legal requirements, pesticide labeling, pests, pesticide types, application equipment, application calibration, and pesticide safety measures.

### *Objectives*

- To acquaint students with employment information and career opportunities in the pesticide industry
- To inform students about the different pests affecting agricultural industries
- To provide students with methods of safe pesticide use
- To familiarize students with calibration of pesticide applications

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in pest control—and relate it to their personal needs and aspirations;
- list the general groups of pests most significant to agriculture;
- discuss the economics of pest damage and control;
- explain various methods of pest controls;
- determine implications, effects, and consequences of the Wisconsin pesticide laws and the use and controls of pesticide;
- recall classifications;
- identify various pesticide formulations;
- locate and interpret information found on pesticide labels and labeling;
- recognize the toxicity of pesticides to both humans and the environment;
- describe methods of protecting people and the environment from incorrect use of pesticides;
- delineate different methods of pesticide applications;
- explain how and why application equipment must be calibrated accurately;
- understand the factors that lead to pesticide resistance in pests; and
- distinguish the application principles behind insect and disease control.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers and related occupations
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Introduction
  - Pest definition
  - Economics of pest damage
  - Pest control methods
- Agricultural pests [Science]
  - Weeds
  - Insects
  - Rodents
  - Plant diseases, fungi, and bacteria
  - Nematodes
- Pesticide types [Science]
  - Classification
  - Chemistry
  - Insecticides
  - Repellents
  - Attractants
  - Acaricides
  - Herbicides
  - Fungicides
  - Bactericides
  - Nematicides
  - Rodenticides
  - Growth regulators
  - Defoliant
- Pesticide characteristics [Science]
  - Emulsifiable concentrates
  - Wettable powders
  - Soluble powders
  - Water-soluble concentrates
  - Oil solutions
  - Flowables
  - Dry flowables
  - Ultralow volume
  - Encapsulated
  - Dusts
  - Granules
  - Fumigants
  - Baits
  - Adjuvants
- Labels and labeling [Social Studies]
  - Labeling requirements
  - Label information
- Human toxicity [Science]
  - Pesticide ingestion

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- Dermal absorption
- First aid treatment
- Lethal dose (LD) number
- Environmental and human protection **[Social Studies]**
  - Protective clothing and equipment
  - Transporting
  - Storing
  - Mixing
  - Applying
  - Container disposal
  - Equipment care
- Application equipment **[Mathematics]**
  - Sprayers
  - Granular application
  - Dusters
- Calibration **[Mathematics]**
  - Sprayer application
  - Granular application
  - Duster application
- Application requirements **[Science]**
  - Insects
  - Weeds
  - Diseases
  - Fungi
- Wisconsin pesticide laws and licensing procedure **[Social Studies]**
  - Applicator licensing
  - Controlled pesticides
- Pesticides and groundwater **[Science]**

### *Motivational Activities*

- Take a field trip to demonstration plots to see pesticide application equipment.
- Invite a chemical field person to give a class presentation.
- View films, videotapes, and slides related to this topic.
- Post bulletin board displays featuring topics related to this unit.
- Obtain a pesticide applicators' certification.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Calculate different pesticide formulations.
- Collect and display labels and pesticide containers.
- Discuss pesticides used on farms and in homes.

- Calibrate a field sprayer.
- Collect samples of important sprayer parts.

## *Instructional Materials*

### **Textbooks and References**

- Complete Guide to Pest Control: With and Without Chemicals* by George W. Ware. Fresno, CA: Thomson Publications, 1980. Available from Nasco.
- Doane's Farm Management Guide*. St. Louis, MO: Doane Agricultural Service, 1985.
- Fundamentals of Machine Operation Crop—Chemicals*. 2nd ed. Moline, IL: John Deere, 1982.
- Insects Pests of Farm, Garden, and Orchard* by Ralph H. Davidson and William F. Lyon. New York: John Wiley and Sons, 1986.
- The New Pesticide User's Guide* by Bert L. Bohmont. Englewood Cliffs, NJ: Prentice Hall, 1983.
- Pest Management Principles for the Commercial Applicator* by Ron Doersch et al. Madison, WI: Cooperative Extension Service, 1983.
- Pest Management Principles for the Wisconsin Farmer* by Ron Doersch et al. 2nd ed. Madison, WI: Cooperative Extension Service, 1988.

### **Bulletins and Pamphlets**

The following is available from the Chemical Manufacturer's Association.

#### *Agricultural Chemicals*

The following are available from Ciba-Geigy.

#### *Pesticide Lesson Plans for Vocational Agriculture Spray Application Guide*

The following are available from the Cooperative Extension Service.

- Controlling Deer Damage in Wisconsin*. G3083.
- Corn Pest Management in Wisconsin-1988*. A1684.
- Forage and Small Grain Pest Control in Wisconsin-1988*. A1981.
- Hazardous Waste Laws: A Guide for Commercial Pesticide Applicators*. A3170.
- Pesticide Drift and Overspray—Wisconsin State Rules*. A3302.
- Quackgrass Control in Field Crops*. NCR219.
- Soybean Pest Management in Wisconsin*. A2782.
- Using Recirculating Sprayers, Roller and Rope-Wick Applicators*. A81AP883.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

#### *Weed Control, Cultural and Chemical*. 6002M. 1978.

The following are available from the United States Department of Agriculture.

- Environmental Trends*. S/N 041-011-00058-1.
- Standard Tests to Characterize Pest Resistance in Alfalfa Cultivators*. S/N 001-000-04415-0.

## Periodicals

*EPA Journal*  
*FDA Consumer*  
*Pest Control Technology*  
*Pesticide and Toxic Chemical News*

## Computer Software

The following are available from Hobar Publications.

*Agricultural Chemicals and Sprayers.* Apple.  
*Crop Chemicals and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Pests and Pest Control.* Apple.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Benefits of Chemical Use.* HS696.  
*Calibrating Pesticide Equipment.* HS700.  
*Integrated Pest Management.* HS629.  
*Pesticide Movement and Misuse.* HS699.  
*Reading Chemical Container Labels.* HS697.  
*Safe Use of pesticides.* HS698.

## Laboratory Resources

The following are available from the Department of Agronomy.

*Study Guide: Pest Management Principles for the Commercial Applicator.* January 1983.  
*Study Guide: Pest Management Principles for the Wisconsin Farmer.* September 1982.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*The Insect Alternative.* 02490 (16mm film, color, 57 minutes). Time-Life Books, 1978.  
*Insects: The Lovely and the Lethal.* 07902 (16mm film, color, 22 minutes) or 10501 (VHS videotape, color, 22 minutes). Encyclopaedia Britannica Education Corporation, 1980.  
*Integrated Pest Management.* 10125 (16mm film, color, 22 minutes) or 11350 (VHS videotape, color, 22 minutes). University of Wisconsin, Department of Agricultural Journalism, 1984.  
*Poisoned Planet.* 07907 (16mm film, color, 19 minutes). United States Department of Agriculture, 1970.  
*Who Shall Reap?* 04383 (16mm film, color, 28 minutes). United States Department of Agriculture, 1969.

The following is available from Hobar Publications.

*Feed Grain Production—Managing the Established Crop for Maximum Profit.* 15400694 (VHS videotape, 30 minutes). Control Data Corporation, n.d.

The following are available from Vocational Agriculture Services.

*Selecting and Handling Pesticides.* F1108-1.2 (62-frame color filmstrip with study guide). 1978.

*Understanding and Safe Use of Pesticides.* F1101-1.1 (72-frame color filmstrip with study guide). 1978.

The following are available from Vocational Educational Productions.

*Fly Control in Animal Units: An Integrated Approach.* 1-614-230H (Filmstrip).

*Pest Identification Kit.* 1-621-200H (Slide set, manual, and student guide).

*Pest Management: An Integrated Approach.* 1-620-230H (Five filmstrips with cassettes and scripts.)

Each part may be ordered separately, titles and order numbers are as follows:

"Components of Integrated Pest Management." Part one. 1-620-232H.

"Components of Integrated Pest Management." Part two. 1-620-233H.

"The Future of Integrated Pest Management." 1-620-235H.

"Introduction to Integrated Pest Management." 1-620-231H.

"Managing an Integrated Pest Management System." 1-620-234H.

#### **Equipment and Facilities**

Field sprayer

Labels and labeling from various pesticides

Samples of various pesticide formulations

## Plant Science (10-90 days)

This unit deals with various aspects of plant science. Topics include career opportunities, plant anatomy, physiological processes, germination, plant requirements, and plant diseases.

### *Objectives*

- To acquaint students with employment information and career opportunities in the plant science industry
- To enable students to distinguish between monocotyledonous and dicotyledonous plants
- To develop student understanding of basic plant morphology
- To develop student understanding of the germination process and of factors affecting germination
- To develop student understanding of the concept of osmosis
- To develop student appreciation of the importance of photosynthesis
- To help students differentiate between photosynthesis and respiration
- To enhance student understanding of plant reproduction
- To provide students with instruction and practice in propagating plants using a variety of methods
- To familiarize students with the various parts of the cell and their functions
- To increase student comprehension of the nutrient requirements of a plant
- To introduce students to the process of transpiration in plants

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the plant science industry—and relate it to their personal needs and aspirations;
- draw and label the parts of a corn and a bean seed;
- conduct and evaluate a germination test;
- demonstrate the process of osmosis;
- explain the chemical changes that take place during photosynthesis;
- discuss the requirements that must be met if photosynthesis is to occur;
- write and explain the chemical formula for respiration;
- discuss the importance of respiration in plant growth;
- draw and label the parts of a complete flower;
- explain the process of fertilization in plants;
- apply the methods of plant propagation;
- explain the function of a plant cell;
- list the basic parts of a plant cell;
- explain the function of roots and the different types;
- explain the function of stems and the different types;
- discuss the various leaf arrangements;
- distinguish differences between the functions of the xylem and the phloem;
- list the major elements that plants require;
- explain the process of transpiration;

- identify damage that pollutants cause; and
- list the five types of microorganisms that cause diseases.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- **Careers**
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- **Seed [Science]**
  - Main parts
  - Function of each part
- **Germination [Science]**
  - Conditions needed for it to happen
  - Steps or changes that take place during the process
  - Location of the root, hypocotyl, and epicotyl
  - Stages in the germination and emergence of a bean plant
  - Define node and internode
  - Location of the food supply in seeds
  - Crops having an active hypocotyl
  - Crops having an inactive hypocotyl
- **How plants manufacture their foods [Science]**
  - Define photosynthesis
  - Conditions necessary for the process of photosynthesis to take place
  - Types of chlorophyll
  - Raw materials
  - Manufactured product
  - By-product of the process
  - Stages of photosynthesis
- **Plant nutrients [Science]**
  - Define a plant nutrient, an element
  - Elements necessary for normal plant growth
  - The process of diffusion
  - The process of osmosis
  - Movement of nutrients within the plant
- **Respiration [Science]**
  - Chemical reactions involved in the process
  - Respiration in higher forms of plant life
  - Surplus foods

- **Water [Science]**
  - Its functions in the life of a plant
  - Meaning of the term "water requirement"
  - Amount required by different species
  - The process of transpiration
  - Factors affecting the water requirement of plants
- **Reproduction of plants [Science]**
  - Methods of reproduction
  - Components of a complete flower
  - Characteristics and functions of the flower components
  - The similarities and differences of flowers
  - The production of pollen and its function
  - The process of pollination, self-pollination, and cross-pollination
  - Steps or stages that take place from the time of pollination to fertilization
  - Define fertilization
  - Asexual reproduction
- **Plant composition [Science]**
  - Makeup of plant cells
  - Purpose of plant roots
  - Types of plant roots
  - Purpose of plant stems
  - Difference between a herbaceous and a woody stem
  - Purpose of plant leaves
  - Types of leaves
  - Three main leaf arrangements
  - Purpose of the xylem and the phloem
- **Longevity of plants [Science]**
  - Annuals
  - Biennials
  - Perennials
- **Effects of air pollutants on plants [Science]**
  - Extent of the problem
  - Different types of pollutants and their symptoms
- **Plant diseases and causes [Science]**
  - Five types of microorganisms that cause diseases
  - Conditions favorable for diseases
  - Control of diseases
- **Classifications of plants [Science]**
  - Need for classification
  - Development of the present classification system
  - Common and scientific names
  - Important families of agricultural plants
  - Agricultural crops belonging to the *Gramineae* family



### *Motivational Activities*

- Take field trips to farms, test plots, gardens, and greenhouses.
- Invite resource speakers, such as a county extension agent for horticulture or a greenhouse manager, to give class presentations.
- Display models showing the parts of a flower.
- Provide preserved plant specimens for observation.
- Post bulletin board displays featuring topics related to this unit.
- Use films, filmstrips, slides, transparencies, videotapes, and computer software to teach the class about plant growth.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect and prepare a display of common crop seeds.
- Conduct experiments on seed germination, osmosis, and diffusion.
- Dissect corn and bean seeds and identify their parts.
- Collect and identify the different flowers and their parts.
- Classify plants grown in the community.
- Classify plants found in pictures and films.
- Use plant specimens to identify plant species and their morphology.

### *Instructional Materials*

#### **Textbooks and References**

- Crop Production* by Richard Delorit and Louis Greub. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Horticulture: A Basic Awareness* by Robert F. Baudendistel. Reston, VA: Reston Publishing, 1979.
- Horticulture: Principles and Practice Applications* by Raymond P. Poincelot. Englewood Cliffs, NJ: Prentice Hall, 1980. Available from National Farm Book Company.
- Modern Corn Production* by Samuel R. Aldrich. Champaign, IL: A&L Publications, 1986. Available from National Farm Book Company.
- Modern Soybean Production* by Walter O. Scott and Samuel R. Aldrich. Cincinnati, OH: Farm Quarterly, 1983. Available from National Farm Book Company.
- Producing Vegetable Crops* by George W. Ware and J.P. McCollum. 3rd ed. Danville, IL: Interstate, 1980. Available from National Farm Book Company.

#### **Bulletins and Pamphlets**

The following is available from the Cooperative Extension Service.

*How a Corn Plant Develops.* A81ASR48.

*How a Soybean Plant Develops.* A81ASR53.

*Soil Test Recommendations for Field, Vegetable and Fruit Crops.* A2809.

*Young Greenhouse, Bedding, Garden and Landscape Plant Disorders: Damping Off.* A2700.



## **Periodicals**

*Crop Science*

## **Computer Software**

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Plant.* Apple.

*Agri-Quiz: Crops.* Apple, IBM.

The following is available from Shannon Software, Ltd.

*The Gardener's Assistant.* Apple, IBM.

## **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Crop Enterprise Selection.* HS132.

*Crop Production Plans.* ADN57.

*Plant Science.* CLF300.

## **Films, Videotapes, and Slides**

The following are available from Agri-Farm Publications, Inc.

*Botany for Gardeners.* 4013 (Two filmstrips with cassettes, program guide, and reproducible masters).

*Requirements for Health.* 4015 (Three filmstrips with cassettes, program guide, and reproducible masters).

The following are available from Photocom.

*The Indoor Plant Care Series.* 41-567 (Three filmstrips with cassettes).

*Plant Propagation.* 01-6044-1 (Volume I) and 01-6044-2 (Volume II). (VHS videotape, 25 minutes.) 1987.

*Vegetable Gardening.* 41-009 (Filmstrip with cassette).

The following is available from Teaching Aids, Inc.

*Careers in Horticulture.* GA-2-7862 (Two filmstrips with cassettes, library kit, and teacher's guide).

## Pollution (5-15 days)

This unit deals with pollution. Topics include career opportunities, pollutant sources, chemical and physical properties of pollutants, pollutant concentrations, effects of air pollution, air quality, water sources, demand for water, water quality, watershed protection, and water treatment.

### *Objectives*

- To acquaint students with employment information and career opportunities in the pollution control industry
- To develop student understanding of atmospheric and geological processes affecting distribution and movement of pollutants in the environment
- To develop student understanding of the sources and properties of various pollutants
- To create student awareness of how pollutants are measured and described
- To facilitate student inquiry into the effects of various pollutants
- To help students assess alternative pollution control methods
- To prepare students to develop a written plan for a specific pollution problem

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the pollution-control industry—and relate it to their personal needs and aspirations;
- demonstrate an understanding of the natural processes that occur in the atmosphere;
- list sources of air pollutants and describe their effects on the environment;
- describe the physical, chemical, and radioactive properties of various pollutants;
- demonstrate the ability to express concentrations of smoke density, suspended particulates, dust fall, and radioactive material;
- describe the use of planned industrial site selection and zoning for maintaining air quality;
- list and describe various types of air pollution control equipment;
- describe three natural ways to control air pollution;
- test the oxygen content of a pond or stream to an accuracy of two parts per million;
- test pH of pond or stream water to within one pH-level of accuracy;
- test water temperature of lake or pond to within accuracy of three degrees;
- develop a complete written management plan for a designated stream, lake, or pond;
- understand some of the properties of pollutants; and
- recognize possible sources and types of pollution.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements

- Working conditions
- Opportunities for advancement
- Other factors
- Sources of pollutants [Science]
  - Industry
  - Municipalities
  - Individuals
  - Internal combustion
  - Agriculture
  - Natural
- Physical properties [Science]
  - Particulates
    - Size
    - Prevalence
    - Properties
  - Gases
- Chemical properties [Science]
  - Sulfur
    - Sulfur dioxide
    - Hydrogen sulfite
  - Carbon
    - Carbon monoxide
    - Carbon dioxide
    - Soot
  - Hydrocarbons
    - Olefins
    - Aromatics
  - Nitrogen
    - Nitric oxide
    - Nitrogen dioxide
  - Fluorine
  - Ozone
  - Other pollutants
    - Lead
    - Beryllium
    - Arsenic
    - Asbestos
    - Radioactivity
      1. nature of radioactivity
        - alpha rays
        - beta rays
        - gamma rays
      2. isotopes
      3. ionization
      4. radioactivity sources
      5. radioactivity symptoms

- Expressing concentration of pollutants [Science]
  - Smoke density
  - Suspended particulates
  - Dust fall
  - Radioactive materials
  - Gases
- Effects of air pollution [Science, Social Studies]
  - Human and animal health
  - Visibility
  - Climate
  - Vegetation
  - Economic aspects
  - Materials
- Maintaining air quality [Careers, Science, Social Studies]
  - Site selection and zoning
    - Planning and land use
    - Zoning ordinance
    - Large air pollution zoning jurisdictions
    - Interstate contracts
    - International agreements
    - Plant locations
  - Controlling air pollution
    - Process change
      1. substitution of raw materials or fuel
      2. modification of equipment
      3. improvement of operating procedures
    - Application of control equipment
      1. gravity settling chambers
      2. inertial separators
      3. cyclone separators
      4. filters
      5. electrostatic precipitators
      6. scrubbers
      7. incinerators
- Sources of water [Science]
  - Rainwater
    - Area
    - Storage
    - Cisterns
  - Surface water supplies
    - Ponds and lakes
    - Rivers
    - Groundwater supplies
      1. springs
      2. shallow wells
      3. deep wells

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4. artesian wells
5. infiltration galleries
6. filter crib and flooded areas

- Demand for water [Social Studies]

- Agriculture
- Residential
- Industrial
- Fire
- Demand factors
  - Living standards
  - Climate
  - Quality
  - Size of city

- Watershed protection [Careers, Social Studies]

- Wastewater pollution
  - Residential
  - Industrial
- Recreation
- Erosion

- Evaluating water quality [Science]

- Potability
  - Microorganisms
  - Taste
  - Odor
  - Other
- Chemical
  - Calcium
  - Magnesium
  - Iron
  - Manganese
  - Sulfur
  - Carbon dioxide
  - Methane
- Physical
  - Hardness
  - Corrosiveness
  - Color
- Manufactured pollutants
  - Phenols
  - Metal wastes
  - Acids
- Natural pollutants
  - Fluorides
  - Phosphates
  - Manganese
  - Iron
  - Nitrates

- **Water treatment [Science]**

- Plain sedimentation
- Aeration
- Sand filter
- Coagulation
- Storage sedimentation
- Chlorination
- Softening
- Stabilization
- Fluoridation
- Corrosion control
- Algae control
- Taste and odor control
- Demineralization

### *Motivational Activities*

- Take field trips to
  - a factory to observe its pollution-control devices in action,
  - a water-testing laboratory,
  - a garage to see a demonstration of an automobile's emission-control devices, and
  - a watershed to locate possible sources of pollution in the area.
- Set up classroom demonstrations by
  - filling various size containers with water and monitoring the evaporation from them.
  - putting sweet potatoes in a water-filled container to demonstrate loss through transpiration.
  - filling containers with water from different sources and conducting periodic bacteria counts.
- Invite resource people, such as the following, to give class presentations:
  - a representative from a health-related association to describe the effects of air pollution on humans and animals, and
  - a public health official to explain the importance of having a safe water supply.
- Survey the community and list possible sources of pollution.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Examine air pollution data to become familiar with the terminology for expressing concentrations of pollutants.
- Examine vegetation to observe how air pollution affects growth rates.
- Identify the three largest water consumers in the area and determine their daily water consumption.
- Monitor how many inches of rain falls on an acre of land over a given period of time and convert it into gallons.
- Set up a rain gauge and keep a daily record of rainfall for the duration of the module.
- Locate the permanent rainfall checkpoints and determine the rainfall distribution pattern.
- Collect water samples from various sources and, using a water-pollution detection kit, determine the presence or concentrations of the following: alkalinity, ammonia, calcium, carbon dioxide, chloride, chlorine, chromium, copper, cyanide, dissolved solids, iron, magnesium, nitrates, phosphates, selenates, and sulfur.

- Practice determining the pH and hardness of fresh water supplies.
- Collect samples of water for testing.
- Interpret laboratory water test results.
- Determine the boundaries for your local watershed.

### *Instructional Materials*

#### **Textbooks and References**

- Air Pollution* by Arthur C. Stern. 3rd ed. New York: Academic Press, 1986.
- Air Pollution Experiments for Junior and Senior High School Classes* by Donald C. Hunter. 2nd ed. Pittsburgh, PA: Air Pollution Control Association, 1972.
- Air Pollution Primer* by Rena Corman. New York: American Lung Association, 1978.
- Elements of Water Supply and Wastewater Disposal* by Gordon Maskew Fair et al. 2nd ed. New York: John Wiley and Sons, 1971.
- Environmental Science* by P.W. Purdon and S.H. Anderson. 2nd ed. Columbus, OH: Merrill Publishing, 1983.
- A Guide to the Study of Environmental Pollution* by W.A. Andrews. Englewood Cliffs, NJ: Prentice Hall, 1972.
- Water and Wastewater Technology*. Washington, DC: U.S. Department of Education, 1968.
- Water Quality and Its Control* by J.C. Lamb. New York: John Wiley and Sons, 1985.

#### **Pamphlets and Bulletins**

The following are available from the Cooperative Extension Service.

- Acid Rain in Wisconsin: Sulfur Emissions: A Soil "Balance" Perspective*. G3305-1.
- Acid Rain Measurements: What They Mean*. G3305-2.
- Aldicarb and Wisconsin's Groundwater*. G3218.
- Drinking Water Contamination: Understanding the Risks*. G3339.
- Nonpoint Pollution: Causes and Consequences*. G2956.
- Pesticides in Groundwater: How They Get There; What Happens to Them, How to Keep Them Out*. G3213.
- Solid Waste Disposal*. G2854.
- Using Whey on Agricultural land—A Disposal Alternative*. G3098.
- Wisconsin's Sensitivity to Acid Rain: The Role of Geologic Materials and Soils*. G3305-3.

The following are available from the Minnesota Extension Service.

- Controlling Odors From Swine Buildings*. AG-FO-2506.
- Designing Sewage Treatment Systems for Resorts*. AG-BU-0542.
- Iron in Drinking Water*. AG-FO-1318.
- Noise—The Invisible Agricultural Hazard*. AG-FO-0816.
- Town and Country Sewage Treatment*. AG-BU-1360.
- Water Quality for Livestock and Poultry*. AG-FO-1864.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

- Control of Water Erosion and Sediment Pollution*. 5013N.

## Periodicals

*Environmental Pollution*  
*Soil and Water Conservation News*  
*Wisconsin Natural Resources*

## Laboratory Resources

The following is available from the Central Wisconsin Groundwater Center.

*Groundwater Flow Model*

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Acid From Heaven*. 07124 (16mm film, color, 30 minutes). National Film Board of Canada, 1982.  
*Environment*. 00586 (16mm film, color, 29 minutes). BFA Films, 1971.  
*Man's Effect on the Environment*. 00588 (16mm film, color, 14 minutes). BFA Films, 1971.  
1985. 09219 (16mm film, color, 56 minutes). Films, Inc., 1970.  
*Noise—Polluting the Environment*. 09264 (16mm film, color, 16 minutes). Encyclopaedia Britannica Educational Corporation, 1971.  
*Poisoned Planet*. 07907 (16mm film, color, 19 minutes). CRM/McGraw-Hill, 1970.  
*Pollution: How Much Is a Clean Environment Worth?* 10780 (VHS videotape, color, 30 minutes). Annenberg/CPB Project, 1986.  
*Pollution of the Upper and Lower Atmosphere*. 00777 (16mm film, color, 17 minutes). Learning Corporation of America, 1975.  
*Solutions to Pollution*. 08649 (16mm film, color, 17 minutes). Academy, 1971.

## Equipment and Facilities

Water-testing laboratory equipment  
Water test kits



## Poultry Science (10-20 days)

This unit deals with various aspects of the poultry industry. Topics include career opportunities, the anatomy of fowl, management techniques, incubation, and marketing.

### Objectives

- To acquaint students with employment information and career opportunities in the poultry industry
- To provide students with guidelines for selecting and culling to maintain a productive laying flock
- To develop student understanding of poultry anatomy
- To facilitate student inquiry into the incubation and hatching process
- To assist students to develop a comprehensive management plan for a specific poultry operation
- To acquaint students with the marketing of eggs and poultry meat

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information such—as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the poultry industry—and relate it to their personal needs and aspirations;
- list the major poultry-producing states and counties in Wisconsin;
- list at least four main species of poultry;
- identify at least four main breeds or varieties of at least four species of poultry and their main use;
- identify parts of the various body systems from drawings or specimens and explain their function;
- determine the outcome of a specified mating of poultry by using genetics;
- describe embryo development and identify management and hatchery factors influencing hatchability;
- outline a management program (i.e., feeding, housing, equipment, and disease and parasite control) for growing broilers, replacement pullets, and the laying flock;
- outline a complete management program for the production of turkeys, ducks, and geese;
- distinguish a laying hen from one that is not in production;
- list the market grades of poultry meat and eggs and explain the factors determining these grades;
- summarize the production and price trends in poultry and eggs; and
- describe the methods of marketing poultry and eggs.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- The poultry industry [Careers, Mathematics, Social Studies]
  - Distribution
  - Economic importance
  - Advantages
  - Disadvantages
- Fowl anatomy [Science]
  - General description
  - Skeleton
  - Muscular system
  - Respiratory system
  - Skin
  - Feathers
  - Circulatory system
  - Excretory system
  - Digestive system
  - Nervous system
  - Endocrine glands
  - Male reproductive system
  - Female reproductive system
- Poultry genetic factors [Science]
  - Chromosomes and genes
  - Sex determination
  - Heritability of quantitative characteristics
  - Breeding systems
  - Breeding stock selection
- Poultry stock [Careers]
  - Chickens
  - Turkeys
  - Ducks
  - Geese
  - Peafowl
  - Others
  - Sources of poultry replacements (e.g., hatcheries)
  - Culling the flock
- Incubation and hatchery management [Science]
  - Embryo development
  - Factors influencing hatchability
  - Hatchery management
- Brooder management [Science]
  - Temperature
  - Ventilation
  - Litter
  - Cage and floor rearing
  - Lighting
  - Disease control

- Poultry housing and equipment [**Careers, Mathematics, Science**]
  - Temperature
  - Moisture
  - Ventilation
  - Insulation
  - Design and construction
  - Nests
  - Perches
  - Cages
  - Litter disposal
  - Pest control
- Feeding principles and practices [**Science**]
  - Essential nutrients
  - Feed additives
  - Metabolic processes
  - Feedstuff sources
  - Nutrient requirements of poultry
  - Poultry rations
- Poultry diseases and parasites [**Science**]
  - Maintaining poultry health
  - Classification of poultry diseases and controls
  - Classification of poultry parasites and controls
- Marketing poultry products [**Careers, Mathematics, Social Studies**]
  - Poultry price and production trends
  - Geographic impacts
  - Marketing eggs
  - Marketing poultry meat

### *Motivational Activities*

- Take field trips to
  - a state FFA poultry- and egg-judging contest;
  - a hatchery;
  - a pullet-rearing or broiler-growing operation;
  - a laying-flock operation;
  - an egg- or poultry-processing plant; and
  - an operation that raises turkeys, ducks, or geese.
- View a film on the development of an embryo chick.
- Invite resource speakers to give class presentations on the poultry industry.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Demonstrate egg candling and grading.
- Set up a brooder in the classroom or shop.

- Demonstrate how to
  - grade and dress poultry,
  - debeak a bird, or
  - cull laying hens.
- Perform a postmortem examination.
- Explain how to select birds for show.
- Identify poultry breeds and varieties using pictures or live birds.
- Identify parts of poultry using a live bird.
- Exhibit birds at a fair.

### *Instructional Materials*

#### **Textbooks and References**

- ABC of Poultry Raising* by J.H. Florea. 3rd ed. New York: Dover Publications, 1977.
- The Complete Handbook of Poultry Keeping* by Stuart Banks. New York: Van Nostrand Reinhold, 1979.
- Ducks and Geese in Your Backyard: A Beginner's Guide* by Rick Luttmann and Gail Luttmann. Emmaus, PA: Rodale Press, 1978.
- The Family Poultry Flock*. Brookfield, WI: Farmers' Digest, 1987.
- Livestock and Poultry Production* by Clarence E. Bundy et al. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1975.
- Modern Livestock and Poultry Production* by James Gillespie. 2nd ed. Albany, NY: Delmar, 1983.
- Poultry Production* by Nalden C. Nesheim. 12th ed. Philadelphia, PA: Lea & Febiger, 1979.
- Poultry Science* by M.E. Ensminger. 2nd ed. Danville, IL: Interstate, 1980.
- Raising Game Birds* by Dan W. Scheid. 7th ed. Brookfield, WI: Farmers' Digest, 1986.
- Raising Poultry the Modern Way* by Leonard S. Mercia. Pownal, VT: Storey Communications, 1975.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Should I Raise a Small Poultry Flock?* A2623.
- Small Turkey Flock Management*. NCR60.
- Poultry Farm Pest Control*. A2227.
- Home Slaughter of Poultry*. A1478.
- Preventing Common Chicken Diseases*. A2885.
- Raising Geese*. AF2251.
- Raising Waterfowl*. A3311.

The following is available from the Pennsylvania Instructional Materials Service.

*Approved Practices for Pullet Growing*

#### **Periodicals**

*Farm Journal*  
*Successful Farming*

## **Computer Software**

The following is available from Hobar Publications.

*Poultry and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Poultry.* Apple, IBM.

## **Laboratory Manuals**

The following are available from Nasco.

*Color Pictures of the Poultry Breeds.* C9687N (Chart).

*Egg Chart.* C9699N.

*External Parts of the Fowl.* C9701N (Chart).

## **Films, Videotapes, and Slides**

The following are available from Nasco.

*Anatomy of the Fowl.* C10252N (54-frame color filmstrip with illustrated script).

*Culling Poultry.* C10080N (19 color slides).

*Grading Eggs for Quality.* C11987N (Color filmstrip with cassette and script).

*Judging Poultry, Live and Dressed.* C10167N (56 color slides with lecture guide).

The following are available from Teaching Aids, Inc.

*Egg Grading.* CEV-528 (VHS videotape, 50 minutes).

*Evaluating Ready-to-Cook Poultry.* CEV527 (VHS videotape, 45 minutes).

*Introduction to Poultry Judging.* CEV525 (VHS videotape, 20 minutes).

*Judging Pullets and Hens.* CEV-526 (VHS videotape, 38 minutes).

The following is available from Vocational Education Productions.

*Poultry Judging Series.* 1-460-200H (Two sound filmstrips).

## **Equipment and Facilities**

Egg candler

Poultry cage

Incubator

Feeders

Waterers

Egg scale

## **Recreation Management (15-30 days)**

This unit deals with recreation management. Topics include career opportunities, history of Wisconsin State Parks and Recreation programs, resource philosophies, trends, issues, goals, and strategies.

### *Objectives*

- To acquaint students with employment information and career opportunities in recreation management
- To assist students in understanding resource philosophy
- To increase student comprehension of trends affecting state parks and recreation programs
- To familiarize students with the issues, goals, and strategies of Wisconsin State Parks and Recreation programs
- To provide students with a basis for understanding fisheries management as it relates to recreation management
- To inform students of the history of fisheries management
- To help students understand critical issues and strategies of fisheries management
- To acquaint students with the multiple-use concept.

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in recreation management—and relate it to their personal needs and aspirations;
- trace the history of the state park system and the recreation industry in Wisconsin;
- describe a personal philosophy regarding natural resources and recreation;
- assess the major trends affecting the state park system;
- identify several major issues concerning recreation management;
- cite the primary goals of recreation management;
- evaluate alternative strategies for achieving recreation goals;
- outline the history of fisheries management in Wisconsin;
- examine critical issues in fisheries management;
- propose solutions to problems in fisheries management; and
- discuss the multiple-use concept as it applies to natural resources.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Natural resources management
  - Campsites and recreational center planning
  - Regulations enforcement
    - Parking
    - Campfires
    - Use of facilities
    - Sanitation
    - Access for people with disabilities
      - 1 picnic grounds
      - 2 campgrounds
      - 3 hunting and fishing areas
  - Wild game breeding and production
  - Wildlife research
- History of Wisconsin State Parks and Recreation programs
  - Origin
  - State park system
  - Legislation
    - State Park Bill
    - Outdoor Recreation Act Program
- Resource philosophy
  - Natural resources and recreational opportunities
    - Scenic, geological, and cultural
    - Archaeological resources
  - Habitats
  - Park uses
  - Public and user responsibilities
- Trends affecting state park programs [Social Studies]
  - Population
  - Social
  - Economic
  - Recreation
  - Technology
  - Outdoor education
  - Workplace
- Issues [Social Studies]
  - Financing
  - Resource
  - Recreation
  - Education
  - Human
- Goals and strategies [Science]
  - Resources
    - Resource preservation
      1. land acquisition

- Outdoor recreational and educational activities resources
  - 1. public access
  - 2. user costs
- Facility expansion
  - 1. undeveloped land
  - 2. master park plans
- Manage resources ecologically and economically
  - 1. conservation practices
  - 2. land ethics
- Recreation
  - Outdoor recreation
    - 1. active
      - picnicing
      - swimming
      - hiking
    - 2. passive
      - fishing
      - scenic
  - Provide small- and large-group recreation facilities
    - 1. designate space
    - 2. cultural programs
  - Public access improvement
    - 1. plan access
    - 2. trails development
    - 3. year-round access
    - 4. access for people with disabilities
- Education
  - Expand educational services
  - Provide more assistance to school environmental programs
- Human resources
  - Hospitality and services
  - Trained and dedicated staff
  - Trained and dedicated volunteers
- Fisheries management [Social Studies]
  - History
    - Resources
    - Rules and regulations
- Critical issues [Science]
  - Government role
  - Fisheries workload
  - Social issues
  - Changing human population
  - Treaty rights
  - Complex regulations
  - Alteration of fish habits
  - Overfishing



- **Strategies [Science]**
  - Change traditional approach
  - Modify regulation
  - Increase environmental monitoring
  - Greater emphasis on warm-water fisheries
  - Fisheries personnel recruitment

### *Motivational Activities*

- Locate recreation areas on a county map.
- Plan a new recreation area.
- Prepare a guide brochure for hunters and fishers.
- Take field trips to recreational areas.
- Invite resource speakers to give class presentations.
- Develop group projects on careers in recreation management.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Compile a list of careers or occupations in the recreation management industry.
- List all state parks, their locations, and their facilities.
- Discuss the philosophy, critical issues, and strategies of Wisconsin State Parks and Recreation programs.
- Interview game wardens and fisheries managers.
- Prepare a report on the recreational uses of forests, the history of the U.S. Park Service, or future forest land trends.

### *Instructional Materials*

#### **Textbooks and References**

- Agriculture, Economics and Resource Management* by Milton M. Snodgrass and Tim Wallace. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1980.
- Conservation and Management of Natural Resources in the United States* by Charles F. Bennett. New York: John Wiley and Sons, 1983.
- Conservation Directory, 1988*. 33rd ed. Vienna, VA: National Wildlife Federation, 1988.
- Forestry Handbook* by Karl F. Wenger. 2nd ed. New York: John Wiley and Sons, 1984.
- Outdoor Recreation in America* by Clayne R. Jensen. Minneapolis, MN: Burgess Publishing, 1985.
- State Comprehensive Outdoor Recreation Plan*. Madison, WI: Bureau of Planning, Wisconsin Department of Natural Resources, 1986.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- County Forests in Transition*. G3262.
- The Effects of Public Land on Property Taxes*. G3240.
- A Guide to Protecting Wisconsin Wetlands*. G3059.

*Transfer of Development Rights: A Theoretical and Case Study Analysis of a New Land Use Policy.* R2771.

*Wisconsin's Recreational Use Statute: Limiting the Injury Liability of Private Landowners.* G3326.

The following are available from the Wisconsin Department of Natural Resources.

*Outdoor Recreation Planning Guide.* Technical Assistance Program.

*Public Lands Open to Hunting.* Poster. 1988.

*Wisconsin State Parks.* A *Wisconsin Natural Resources* magazine supplement.

#### Periodicals

*Conservation*

*Grist: Park Practice Program*

*National Parks* (formerly *National Parks and Conservation Magazine*)

*Parks and Recreation*

*Wisconsin Natural Resources*

#### Filmstrips, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Camping and Recreational Facilities for the Handicapped.* 06026 (16mm film, color, 120 minutes). Indiana University, 1979.

*For You Naturally.* 11900 (VHS videotape, color, 26 minutes) or 06919 (16mm film, color, 26 minutes). Eagle Film Labs, n.d.

*A Marsh Called Horicon.* 10425 (16mm film, color, 28 minutes). Milwaukee Museum, 1982.

*Rise and Fall of the Great Lakes.* 02126 (16mm film, color, 17 minutes). National Film Board of Canada, 1968.

*Running a River: The Wisconsin.* 11180 (16mm film, color, 30 minutes) or 11460 (VHS videotape, color, 30 minutes). University of Wisconsin, Department of Agricultural Journalism, 1986.

*Wilderness World of Sigurd F. Olson.* 11618 (VHS videotape, color, 28 minutes). Filmedia, 1980.

The following are available from the Army Corp of Engineers.

*For All to Enjoy.* (16mm film, color, 24 minutes.) 1971.

*The Great Great Lakes.* (16mm film, color, 28 minutes.) 1975.

## Safety in Agriculture (5-15 days)

This unit deals with agricultural safety. Topics include career opportunities, attitudes and philosophies, potential occupational hazards, and a working knowledge of preventative measures and first aid procedures.

### *Objectives*

- To acquaint students with employment information and career opportunities regarding safety in agriculture
- To enhance student awareness of the importance of a "think safety first" attitude
- To demonstrate safety measures in school and agricultural settings
- To explain in detail specific agricultural hazards and precautionary steps
- To create an awareness of immediate and long-term effects of an accident on the victim and others involved

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancements, and other factors relative to potential employment in the agricultural safety field—and relate it to their personal needs and aspirations;
- appreciate the philosophy of safety;
- incorporate a philosophy of safety that must be practiced at all times;
- identify potential hazards in agribusiness occupations and determine corrective and preventative measures;
- comprehend knowledge of safety in the classroom, laboratory, and in other instructional settings, and
- better understand accident implications and how to deal most effectively with accidents.

*Subject Matter* (Basic skills integration are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Agricultural equipment operation
  - Tractor safety
  - All-terrain vehicle (ATV) safety
  - Harvesting equipment safety

- Storage and feeding equipment safety
- Other equipment safety considerations
- Maintenance facilities
  - School labs
  - Home Shops
- Farmstead structures
  - Home safety
  - Crop storage facility safety
  - Livestock housing safety
  - Equipment storage safety
  - Livestock waste management safety
- Agricultural safety hazards [Mathematics]
  - Fire
    - Prevention
    - Escape routes and control procedures
  - Electricity
    - Wiring
    - Current breaker boxes
    - Appliances
  - Rural traffic and transportation
  - Recreation
  - Agricultural chemicals
    - Determinants of chemical use
      1. threshold levels
      2. scouting
      3. visible signs of pest damage
      4. integrated pest management/alternatives
    - Chemical handling and storage precautions
    - Proper disposal methods
  - Safety around livestock
    - Large animals
    - Poultry and small animals
    - Pets
- Natural disasters
  - Tornadoes
- Accident implications [Social Studies]
  - First aid procedures
  - Insurance claims
  - Change in lifestyles
  - Legal implications
  - Reporting to authorities
  - Rebuilding process

- Climate safety
  - Sunburn
  - Heat stroke
  - Hypothermia
  - Frostbite
- Personal safety
  - Hearing loss
  - Vision loss

### *Motivational Activities*

- Take field trips to a farm implement dealer, and an agricultural equipment manufacturer, or a farm.
- Interview a victim of a farm accident.
- Post bulletin boards featuring safety tips.
- Invite the following resource people to give class presentations:
  - a firefighter from the local fire department to give a demonstration in fire safety, including how to use a fire extinguisher,
  - an insurance representative to address how safety precautions affect insurance premiums,
  - an emergency medical technician (EMT) to give a cardiopulmonary resuscitation (CPR) demonstration,
  - a law enforcement officer to speak on driving safety, and
  - a representative from the local electric company to discuss the safe use of electrical power.
- Arrange for the class to attend a tractor rollover demonstration or a safety seminar.
- Arrange for the Wisconsin State Patrol to present its seatbelt demonstration.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Develop a safety inspection program for farm or home.
- Design a school safety program for an elementary school.
- Participate in a tractor operator contest.
- Prepare an exhibit about home or agricultural safety.
- Demonstrate how to use hearing protection equipment or fire extinguishers.
- Give a presentation on hard hats and their role in saving lives or on small-machine safety.
- Take part in state and national safety programs.
- Give a presentation on the value of safety shoes.

### *Instructional Materials*

#### **Textbooks and References**

- Agricultural Safety*. Moline, IL: John Deere Company, 1987.
- Farm Field Machinery* by Marshall F. Finner. Madison, WI: American Publishing, 1973.
- Farm Management Handbook* by R.A. Luening and W.P. Mortenson. 6th ed. Danville, IL: Interstate, 1979.
- Mechanics in Agriculture* by Lloyd J. Phipps. Danville, IL: Interstate, 1983.
- Modern Agriculture! Mechanics* by T.J. Wakeman. Danville, IL: Interstate, 1977.

*The New Pesticide Users Guide* by Bert L. Bohmont. Englewood Cliffs, NJ: Prentice Hall, 1983.

### **Bulletins and Pamphlets**

The following are available from the Department of Agricultural Engineering.

#### *Farm Safety Lessons*

*Resource Unit for Teaching Safe Farm Machinery Operation*

*Resource Unit for Teaching Safe Tractor Operation*

The following are available from the Cooperative Extension Service.

*Fatal Farm Accidents in Wisconsin*. A2302.

*Hazardous Waste: Don't Keep It Down on the Farm*. A3103.

*Protective Clothing for Pesticide Users*. EPA-PCPU.

*Safe Handling of Farm Animals*. A3149.

*Safe Use of Farm Tractors*. A8MNF623.

*Wisconsin Farm Safety Inspection Report*. A2374.

The following is available from the National Safety Council.

#### *Rural Accident Prevention Bulletin*

The following is available from Wisconsin Public Service.

#### *Farm Safety Handbook*

### **Periodicals**

#### *Farm Safety Review*

### **Computer Software**

The following are available from Hobar Publications.

*Agricultural Chemicals and Sprayers*. Apple.

*Ag Machinery Safety and Related Review*. Apple, IBM, TRS, Macintosh.

*Home and Farmstead Safety and Related Review*. Apple, IBM, TRS, Macintosh.

*Machine Shop Equipment Safety and Operations*. Apple.

*Tool Safety: Shop and Laboratory and Related Review*. Apple, IBM, TRS, Macintosh.

*Welding Equipment Safety and Operations*. Apple, IBM, TRS.

### **On-line Computer Networks**

The following is available from Ag Ed Network, AgriData Resources, Inc.

*Safe Use of Pesticides*. HS698.

## Laboratory Resources

The following are available from the American Association for Vocational Instructional Materials.

*Applying Pesticides*. 204 (Student manual). 3rd ed. 1988.

*Developing Shop Safety Skills*. 903Sw (Student workbook). 1981.

*Safety Color Coding for the Shop*. 904 (Student manual). 1982.

The following are available from Hobar Publications.

*Power Tool, Safety and Operation*. 173 (Student manual). 1986.

*Safe Operation of Agricultural Equipment*. 10076 (Student manual). 1988.

*Safety Exams*. 631.

## Films, Videotapes, and Slides

The following is available from Bergwall Productions, Inc.

*Chain Saw Safety*. (Series of three filmstrips.)

The following are available from the Bureau of Audio Visual Instruction.

*Agricultural Tractor Safety*. 01030 (16mm film, color, 22 minutes). Purdue University, 1976.

*Farm Tractor Safety*. 01044 (16mm film, color, 11 minutes). International Photographic Center, 1976.

*Fire Safety is Your Department*. 10175 (16mm film, color, 16 minutes). rev. Centron, 1977.

*First Aid: Bleeding and Shock*. 05010 (16mm film, color, 12 minutes). Churchill, 1978.

*How to Have an Accident*. 11351 (VHS videotape, color, 27 minutes) or 07086 (16mm film, color, 27 minutes). University of Wisconsin, Department of Agricultural Journalism, 1983.

*The Safety Factor*. 11466 (VHS videotape, color, 30 minutes) or 11467 (16mm film, color, 30 minutes). Circle Oak Productions, 1986.

The following is available from the National Audio Visual Center.

*Handling Livestock Safely*. (VHS videotape, ten minutes). 1982.

The following are available from the National Farm Medicine Center.

*The Hazardous Work Place*. (VHS videotape, 30 minutes.)

*Introduction to Rural American Lifestyles*. (VHS videotape, 30 minutes.)

*Man and Animal: A Healthy Co-existence*. (VHS videotape, 30 minutes.)

*Seconds Save Lives*. (VHS videotape, 30 minutes.)

*Weather's Effect on Health*. (VHS videotape, 30 minutes.)

The following are available from the Speciality Vehicle Institute of America.

*ATV Rider's Guide to Safety*. (VHS videotape, 19 minutes.)

*Tractor Safety Begins With You*. (VHS videotape, 20 minutes.)

The following are available from Vocational Agriculture Services.

*Selecting and Handling Pesticides.* F1108-1.2 (62-frame filmstrip with study guide and cassette).

*Understanding and Safe Use of Pesticides.* F1108-1.1 (72-frame filmstrip with study guide and cassette).

*Safety on the Job: First Aid for Accidents.* 11874 (VHS videotape, color, 20 minutes) or 11875 (16mm film, color, 20 minutes). AIMS, 1984.

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## Sheep Science (7-27 days)

This unit deals with sheep production in Wisconsin. Topics include career opportunities, classes and breeds of sheep, selection of the breeding flock, feeding the flock, management of the flock, parasites and diseases, marketing meat and wool, and fitting and showing sheep.

### *Objectives*

- To acquaint students with employment information and career opportunities in the sheep science industry
- To create student awareness of the nature and distribution of the sheep science industry in the U.S.
- To provide students with a basis for evaluating sheep production as a source of income and other values
- To acquaint students with various sheep breeds
- To provide students with guidelines for selecting good breeding stock
- To assist students in developing an effective breeding program for sheep
- To acquaint students with the various feeds available for feeding Wisconsin flocks
- To help students design rations for ewes, lambs, and rams
- To develop student understanding of routine sheep management practices
- To create student awareness of the shelter and equipment requirements for sheep production
- To acquaint students with procedures for the prevention and treatment of the parasites and diseases of sheep
- To increase student understanding of the marketing of meat and wool
- To provide students with instruction and practice in evaluating slaughter lambs and wool
- To prepare students to fit and show sheep

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the sheep science industry—and relate it to their personal needs and aspirations;
- identify the leading states in sheep production;
- outline the advantages and disadvantages of the sheep enterprise;
- list the wool classifications for sheep and identify the breeds in each classification;
- discuss the considerations necessary in selecting a breeding flock's foundation stock;
- describe common sheep breeding programs;
- identify the various parts of the sheep;
- balance a ration for Wisconsin flocks using suitable feeds;
- balance a ration for ewes, lambs, and rams;
- prepare a sheep management plan including lambing, weaning, flushing, breeding, gestation, castrating, docking, ear tagging, and shearing practices;
- identify and maintain the types of records necessary for profitable sheep production;
- list the housing and equipment requirements for sheep;

- recognize the various internal and external parasites of sheep, noting the life history, symptoms, prevention, and treatment;
- discuss the diseases that pose the greatest problems for sheep, noting causes, symptoms, prevention, and treatment;
- explain the law of supply and demand and its implications for the marketing of wool and meat;
- identify the grades of slaughter lambs;
- compare the different methods of marketing sheep;
- recognize the factors that determine the value of wool; and
- demonstrate and explain techniques for fitting and shearing sheep.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Opportunities in sheep production
  - Advantages and disadvantages of sheep
  - Areas of sheep production
  - Determining the kind and size of operation
- Classes and breeds of sheep
  - Classes
  - Breeds and their characteristics
  - History and registration
- Selection of the breeding flock
  - Considerations in starting a flock
  - Selecting a breed
  - Criteria for selecting individuals
  - Sources of foundation stock
- Feeding the flock [Science]
  - Flushing
  - Feeding the pregnant ewe
  - Lactation rations
  - Feeding the breeding ram
  - Creep rations
  - Fattening rations
- Management of the flock [Science, Social Studies]
  - Breeding and reproduction
  - Recordkeeping
  - Culling the flock
  - Lambing practices

- Docking, castrating, and ear tagging
- Shearing
- Housing and equipment
- Parasites and diseases [Science]
  - Life cycle or cause
  - Symptoms
  - Prevention and treatment
- Marketing meat and wool [Social Studies]
  - Supply and demand
  - Feeder and market grades
  - Methods of marketing
  - Determining the value of wool
- Fitting and showing sheep
  - Show classifications
  - Feeding for the show
  - Shearing and grooming
  - Showing techniques

### *Motivational Activities*

- Take a field trip to a sheep producer, a sheep evaluation contest, or a sheep shearing demonstration.
- Invite resource people, such as a veterinarian or a sheep buyer, to give class presentations.
- View films, videotapes, and slides on topics related to this unit.
- Make available to students computer software related to sheep production or management.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect and analyze feed tags.
- Research and report on breeding systems for sheep.
- Demonstrate how to castrate a lamb.
- Demonstrate how to dock a lamb.
- Label the parts of a sheep on a drawing.
- Identify the components of a lamb carcass using a meat-cutting chart.
- Design a housing and equipment layout for a specific size and type of sheep operation.
- Keep a daily record of prices for market grades of sheep.
- Balance rations, using home-grown and commercial feeds, for various classes of sheep.
- Create a display that depicts the meat and wool characteristics of several breeds of sheep.
- Prepare a meal of lamb for the class to eat.

## *Instructional Materials*

### **Textbooks and References**

- Approved Practices in Sheep Production* by E. M. Juergenson. 4th ed. Danville, IL: Interstate, 1981.
- Feeds and Feeding* by Arther E. Cullison and Robert S. Lowrey. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1987.
- Livestock and Poultry Production* by Clarence E. Bundy and Ronald V. Diggins. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1982.
- Profitable Sheep Farming* by M.M. Cooper and R.J. Thomas. 5th ed. Alexandria Bay, NY: Diamond Enterprises, 1982. Available from Nasco.
- Raising Sheep the Modern Way* by Paula Simmons. Pownal, VT: Storey Communications, 1976. Available from National Farm Book Company.
- The Science of Animal Husbandry* by James Blakely and David Bade. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1985.
- Sheep and Goat Science* by M.E. Ensminger and R.O. Parker. 5th ed. Danville, IL: Interstate, 1986. Available from National Farm Book Company.
- Sheep and Wool Science* by M. Eugene Ensminger. Danville, IL: Interstate, 1970.
- The Sheep Book* by Ron Parker. Danville, IL: Interstate, 1984.
- Sheep Diseases* by Hadleigh Marsh. Baltimore, MD: Williams and Wilkins, 1965.
- The Sheep Raisers Manual* by William K. Kruesi. Charlotte, VT: Williamson Publishing, 1985. Available from Nasco.
- Structure and Development of Meat Animals* by J.J. Swatland. Englewood Cliffs, NJ: Prentice Hall, 1984.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Controlling Disease and Parasites in Your Flock*. A2827.
- Housing Your Flock*. A2830.
- An Introduction to Raising Sheep*. A2831.
- Lamb Slaughtering, Cutting, Preserving and Cooking on the Farm*. AF2264.
- Meat Yields from Beef, Pork and Lamb*. A2584.
- Sheep Abnormalities*. A78862SH.
- Sheep Breeding*. A2825.

The following is available from Hobar Publications.

- Sheep Handbook—Housing and Equipment*. 5776-MWPS-3.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

- Approved Practices for Market Lambs*. 444X. Pennsylvania Instructional Materials Service, 1978.
- Approved Practices for Sheep Breeding*. 443X. Pennsylvania Instructional Materials Service, 1978.
- Judging Sheep*. 447X. Pennsylvania Instructional Materials Service, 1979.

## Periodicals

*Sheep Breeder and Sheepman*

## Computer Software

The following is available from Hobar Publications.

*Sheep Production and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Sheep.* Apple.

*Agri-Quiz: Sheep.* Apple, IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Cash Lamb Prices.* HS413.

*Cash Wool Prices.* HS417.

*Cost of Producing Sheep.* HS192.

*Markets for Sheep and Lambs.* HS410.

*Markets for Wool.* HS414.

*Sheep and Lamb Market Routes.* HS419.

*Sheep and Lamb Marketing.* HS423.

*Sheep/Lamb Analysis; Outlook.* HS422.

*Sources of Lamb Market Facts.* HS421.

*Understanding Lamb Demand.* HS412.

*Understanding Lamb Supply.* HS411.

*Understanding Wool Demand.* HS415.

*Understanding Wool Supply.* HS416.

## Laboratory Resources

The following is available from the National Vocational Agriculture Book Company.

*Livestock Production Manual.* 1973.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Sheep Abnormalities.* 08862 (16mm film, color, 23 minutes). University of Wisconsin, Department of Agricultural Journalism, 1982.

*Sheep, Sheep, Sheep.* 09487 (16mm film, color, 11 minutes). Churchill Films, 1970.

The following are available from Nasco.

*Controlling Internal Parasites of Sheep.* C10418N (70-frame color filmstrip with cassette and script).

*Judging Sheep.* C10102N (43-frame color filmstrip).

*Selection, Fitting, and Showing of Sheep.* Z9882N (VHS videotape, 22 minutes).

*Sheep Management Practices.* Z10450N (Part I, VHS videotape, 30 minutes), Z10452N (Part II, VHS videotape, 30 minutes) or Z10454N (Parts I and II).

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Blocking and Trimming Sheep.* 451X (42-frame color filmstrip). 1971.

*Breeds of Sheep.* 448X (58-frame color filmstrip).

The following are available from Photocom.

*Lambing Time Management, Part I.* 30-761 (VHS videotape, 52 minutes).

*Lambing Time Management, Part II.* 30-762 (VHS videotape, 50 minutes).

*Nutrition and Health.* 30-764 (VHS videotape, 48 minutes).

*Sheep Fencing.* 21-753-9 (VHS videotape, 30 minutes).

*Sheep Showmanship.* 01-011-100 (VHS videotape, 25 minutes).

*Weaning, Finishing, and Marketing Lambs.* 30-763 (VHS videotape, 19 minutes).

The following are available from Vocational Agriculture Services.

*Breeds of Sheep.* S145 (slideset) or F145 (58-frame filmstrip).

*Selecting Breeding Sheep.* 143a (72-frame filmstrip and study guide).

The following are available from Vocational Education Productions.

*Sheep Breed Identification.* 1-430-200H (67-frame slideset and breed information sheets).

*The Sheep Management Series.* 1-431-130H (Six filmstrips with cassettes and scripts).

The following is available from Vocational Media Associates.

*Sheep Production.* 30803-93 (Four parts; sound filmstrips or sound slides, program guide, and masters).

### Equipment and Facilities

Castrator

Tail docker

Clipmaster

Iodine and disinfectant

Cookware

## Small-Animal Health Care (45-90 days)

This unit deals with the area of small-animal technician and management. Topics include careers and employment opportunities, laws and ethics, administrative duties, client relations, animal housing, medical terminology, animal care and handling techniques, and the home as it relates to the care of small animals.

### *Objectives*

- To acquaint students with employment information and career opportunities in the small-animal health care industry
- To enhance student ability to evaluate and choose domestic animals for various uses
- To acquaint students with the anatomy and physiology of domestic animals
- To increase student understanding of domestic animal management practices, including nutrition, reproduction, health maintenance, and housing
- To provide students with examples of recordkeeping systems for domestic animals
- To develop student proficiency in the use of veterinary terminology

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the small-animal health care industry—and relate it to their personal needs and aspirations;
- understand the domination humans have over small and large animals;
- create an understanding of the roles of veterinarians and animal technicians;
- list the laws and ethics governing animal technicians;
- employ a knowledge of administrative duties;
- understand public and client relations as it pertains to the animal technician's career;
- use veterinary medicine terminology;
- undertake small-animal housing management;
- demonstrate proper animal handling and restraint methods;
- list animal care equipment and its uses;
- identify symptoms of disease;
- explain therapy techniques;
- demonstrate animal-care techniques; and
- prepare home-care instructions.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions

- Opportunities for advancement
- Other factors
- Small-animal health care occupations [Careers, Social Studies]
  - Animal technicians
  - Veterinary assistant
  - Small-animal laboratory technicians
  - Pet-store managers and assistants
  - Animal caretakers
  - Veterinary professionals
- Animal domestication [Science, Social Studies]
  - History
  - Animal classification and identification
- Interaction between veterinarians and animal technicians [Careers, Social Studies]
  - Support services
  - Professional relationships
- Laws and ethics governing animal technicians [Social Studies]
  - United States Department of Agriculture regulations
  - United States Department of Health and Human Services regulations
- Administrative duties [Careers, Mathematics]
  - Record keeping
    - Animal identification
    - Treatments administered
  - Animal transportation
  - Check-in and check-out procedures
- Public and client relations [Careers]
  - Telephone communication skills
  - Radio communication skills
  - Office procedures
  - Professional etiquette
- Veterinary medicine terminology [Science]
  - Anatomy and physiology systems
    - Skeletal
    - Respiratory
    - Circulatory
    - Digestive
    - Reproductive
  - Medical instruments
    - Surgical
    - Diagnostic
    - Laboratory



- Diseases
  - Viral
  - Bacterial
  - Fungal
  - Biological products
- Animal housing management [Science]
  - Design
  - Equipment
  - Sanitation
  - Hygiene
  - Feeding
  - Safety
  - Security
- Animal handling and restraint [Science]
  - Types of restraints
  - Restraint tools
  - Handling techniques
    - Lifting
    - Holding
  - Safety
- Animal care equipment [Science]
  - Grooming
  - Tack for pets
  - Feeding equipment
  - Cages
  - Instruments for health care
  - Training equipment
  - Miscellaneous equipment
- Symptoms of diseases [Science]
  - Temperature, respiration, pulse
  - Depression, attitude
  - Scratching, swelling
  - Case history
  - Feces
- Therapy techniques [Science]
  - Surgical drainage
  - Systemic treatments
  - Isolation
  - Cleansing
  - Bandage care

- Animal care techniques [Science]
  - Clipping
  - Infection
  - Skin disorders
  - Physical and chemical disorders
  - Surgery
- Home-care instructions [Science]
  - Animal temperament
  - Home therapy
  - Handling
  - Medication needed

### *Motivational Activities*

- Make a field trip to animal shelter, veterinary clinic, or pet store.
- Invite a veterinarian, animal-shelter manager, pet-store owner, and others in occupations related to small-animal health care to give class presentations.
- Post bulletin board displays featuring topics related to this unit.
- Visit a small-animal zoo.
- Visit a farm to observe its health care program.
- Observe an animal surgery.

### *Learning Activities*

- Participate in Supervised Agricultural Experience program.
- Trace the history and use of one or more breeds of animals using a flow diagram.
- Develop a first-aid kit for small animals.
- Take part in animal shows and fairs.
- Interview a person employed in the animal health industry.
- Put together a booklet listing the equipment used in animal health care.
- Dissect an animal.
- Read and interpret the label on various commercial foods and drugs, and evaluate their value.
- Restrain a cat, dog, or rabbit with various methods.
- Administer a pill to a dog or cat.
- Simulate injections using oranges.
- Identify animal equipment.
- Tie a halter.
- Obtain the pulse, temperature, and respiration from a dog, cat, or rabbit.
- Properly lift a dog or cat to a table.
- Fill out a pharmaceutical order.
- Assist a veterinarian for a day.
- Prepare home-care instructions for various diseases and disorders.
- Examine an animal for internal or external parasites.
- Prepare and administer oral medicines.
- Clip and trim animal nails.
- Groom an animal.
- Report on proper office and field procedures.
- Role-play the correct procedure for client inquiries, routine versus emergency.

## Instructional Materials

### Textbooks and References

- Animal Health* by J.K. Baker and W.J. Greer. Danville, IL: Interstate, 1980. Available from National Farm Book Company.
- Caring for Livestock* by Jaime I. Reibel. *A Veterinary Handbook*. New York: Arco Publishing, 1984. Available from Nasco.
- Clinical Textbook for Veterinary Technicians* by Dennis M. McCurnin. Philadelphia: W.B. Saunders, 1985.
- Dog Owner's Home Veterinary Handbook* by Delbert G. Carlson and James M. Griffin. New York: Howell Book House, 1980.
- The Domestic Rabbit* by J.C. Sandrod. 4th ed. Dobbs Ferry, NY: Sheridan House, 1986.
- Handbook of Laboratory Animal Science: Volume I* by Edward C. Melby. Cleveland, OH: CRC Press, 1974.
- Handbook of Livestock Management Techniques* by R.A. Baltaglia and V. Mayrose. Edina, MN: Burgess International, 1981. Available from National Farm Book Company.
- The Home Pet Vet Guide: Dogs* by Martin Green. New York: Ballantine Books, 1980.
- Livestock Veterinary Health Service* by Dan W. Scheid. Brookfield, WI: Farmers' Digest, 1983. Available from National Farm Book Company.
- Medical Terminology* by G.L. Smith and Phyllis E. Davis. 4th ed. New York: John Wiley and Sons, 1981.
- Take Care of Your Dog with the Home Vet Handbook* by Margaret Crush. New York: News Group Publications, 1983.
- T.V. Vet Book Dog: Recognition and Treatment of Common Dog Ailments and Treatments* by Ed Straiton. 3rd ed. Alexandria Bay, NY: Diamond Enterprises, 1980. Available from Nasco.
- Veterinary Medicine and the Law* by Orland Soave and Lester M. Crawford. Baltimore, MD: Williams and Wilkins, 1981.
- The Veterinary Technician in Small Animal Practice* by Cynthia S. Intravartolo and Ralph C. Richardson. Edina, MN: Burgess International, 1983. Available from National Farm Book Company.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Controlling Fleas*. A3210.
- Giving or Receiving Pets—An Owner's Responsibility*. A8MO9900.
- Internal Parasites of Dogs*. A2675.
- Raising Rabbits for Beginners*. A8MO0554.
- Raising Small Animals and Fowl in Urban Areas*. A2648.

The following is available from *Hoard's Dairyman* magazine.

*How to Treat Common Ailments of Farm Animals*

## Periodicals

*American Journal of Veterinary Research*  
*American Veterinary Medical Association Journal*  
*Cornell Veterinarian*  
*Journal of Small Animal Practice*  
*Veterinary Medicine*

## Computer Software

The following are available from Hobar Publications.

*Livestock Diseases and Parasites.* Apple.  
*Livestock Diseases and Related Review.* Apple, IBM.

## On-line Computer Networks

The following are available from the Ag Ed Network, AgriData Resources, Inc.

*Beef Cow and Calf Health Program.* HS704.  
*Beef Diseases.* CSU380.  
*Beef Parasites.* CSU379.  
*Dairy Cow Health Program.* HS702.  
*Probiotics and Animal Health.* HS701.  
*Swine Diseases.* CSU663.

## Laboratory Resources

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Veterinary Assistant.* 470X. Texas Instructional Materials Service, 1974.  
*Veterinary Records and Office Procedures.* 489X. New York Instructional Materials Service, n.d.

## Films, Videotapes, and Slides

The following is available from the Instructional Materials Service.

*Breeds and Varieties of Rabbits.* 5001a (Color slides). 1986.

The following are available from Nasco.

*Agricultural Careers.* Z10932N (Set of six VHS videotapes, 30 minutes each). Individual videotapes from the set also may be ordered, titles and order numbers are as follows:

"Marketing Specialists." Z10926N.  
"Social Service Professionals." Z10927N.

"Agricultural Producers." Z10928N.  
"Education and Communication Specialists." Z10929N.  
"Agricultural Specialists." Z10930N.  
"Financial Specialists and Managers." Z10931N.

*Breeds of Dogs I.* C11915N (76-frame color filmstrip with study guide).  
*Breeds of Dogs II.* C11916N (80-frame color filmstrip with study guide).  
*Preventive Health Care.* C11978N (Color filmstrip with cassette).  
*Rabbits.* C10477N (Color filmstrip with cassette).  
*Vaccinating Methods Explained.* C10078N (11 black-and-white slides).

The following are available from Photocom.

*Veterinarian.* 21-216 (VHS videotape, 30 minutes).  
*Herd Health/Husbandry.* CD15400681 (This four-tape, VHS-videotape series consists of the following titles: "Distinguishing Normal and Abnormal Cattle," "Normal Movements and Body Positions of Dairy Cattle," "Animal Handling," and "Young Stock Management").

#### Equipment and Facilities

Animal care equipment  
Cages  
Small-animal laboratory  
Dissection kit  
Needles  
Tape  
Grooming equipment  
Syringes

## Small-Animal Management (10-90 days)

This unit deals with the management of small animals and pets. Topics include careers, types of small animals and the care they require, health, housing, and product marketing.

### *Objectives*

- To acquaint students with employment information and career opportunities in the small-animal management industry
- To provide students with a history of small-animal domestication
- To develop student understanding of breeding systems for small animals
- To provide students with instruction in balancing rations for small animals
- To identify and provide examples of satisfactory sanitation systems for small animals
- To provide students with guidelines for proper housing and caging systems for small animals
- To provide students with instruction and practice in the grooming, handling, and training of selected small animals
- To help students understand how to set up and maintain an appropriate recordkeeping system of small animals
- To facilitate student inquiry into ways to efficiently market small animals and small-animal products and supplies

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the small-animal management industry—and relate it to their personal needs and aspirations;
- outline the history of small-animal domestication;
- identify breeds and characteristics of small animals and their uses;
- outline the major parts and explain the functions of each system that makes up the anatomy and physiology of small animals;
- list and explain reproduction and breeding systems of small animals;
- describe the basic principles of nutrition for small animals;
- identify the major diseases and parasites of small animals and their control measures;
- design an effective sanitation system for small animals;
- explain recommended housing or caging systems for small animals;
- explain the correct grooming, handling, and training of selected small animals;
- describe the procedures used in determining the sex of small animals;
- describe the kinds of record keeping necessary for small-animal management;
- use and understand the terminology used in this career area;
- find a profitable market for small animals or products;
- understand computerized records and recordkeeping; and
- develop an appreciation of small animals and pets.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Employment opportunities involving small-animal management, including the job responsibilities, requirements, and training for job entry into each
  - Animal technician (veterinary assistant)
  - Animal caretaker
  - Small-animal laboratory technicians
  - Pet-store managers and assistants
  - Veterinarian
- The domination of humans over small and large animals
  - Early history of domestication
  - Animal classification and identification
  - Breed identification
  - Development and use of breeds
- Kinds of small-animal management
  - Laboratory animals
  - Dogs (canines)
  - Cats (felines)
  - Small stock and fur animals
  - Gerbils
  - Hamsters
  - Guinea Pigs
- Anatomy and physiology by species [Science]
  - Skeletal system
  - Respiratory system
  - Circulatory system
  - Digestive system
  - Endocrine system
  - Reproductive system
  - Nervous system
  - Excretory system
  - Muscular system
  - Skin
- Reproduction and breeding by species [Science]
  - Physiology of reproduction
  - Reproduction in the male
  - Reproduction in the female
  - Breeding small animals

- Nutrition and feeding by species [Science]
  - Basic principles of nutrition
  - Feed composition and measures of nutrient value
  - Routine and experimental feeding
  - Methods of feeding
  - Food consumption
  - Nutrient requirements
- Health problems, disease, and parasite control [Science]
  - Common infections and noninfectious diseases
  - Transmission of diseases
  - General procedures for disease diagnosis
  - Common external and internal parasites
  - Noninfectious and miscellaneous ailments
  - Management practices, sanitation, and disease control
- Housing and caging small animals
  - The animal house or housing facility
  - Animal cages
  - Feeding and watering equipment
- Management of small animals [Mathematics]
  - Handling and restraint
  - Sexing
  - Computerized recordkeeping
  - Legal requirements
- Product Marketing [Social Studies]
  - Pelts
  - Meat
  - Breeding stock
  - Research animal

### *Motivational Activities*

- Take field trips to animal shelters, veterinary clinics, and pet stores.
- Invite veterinarians, animal-shelter managers, pet-store owners, and others in occupations related to small-animal management to give class presentations.
- Post bulletin board displays.
- View film, videotape, and slide presentations on small-animal management.
- Visit a small-animal zoo.
- Arrange for a pet-grooming demonstration.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Using a flow diagram, trace the history and use of one or more breeds of small animals.
- Develop a management outline for one kind of small animal.
- Collect literature and samples of small-animal management aids (feed, health products, and so on).



- Review individual or panel reports on various aspects of small-animal management.
- Raise and manage a cage of small animals in the classroom.
- Take part in animal shows and fairs.
- Review concepts with computerized programs.
- Give reports on care and management of pets with which you have worked.
- Observe dog obedience classes or field trials for hunting dogs.

## *Instructional Materials*

### **Textbooks and References**

- Cat Owner's Home Veterinary Handbook* by Delbert G. Carlson and James M. Griffin. New York: Howell Book House, 1983.
- The Color Nature Library—Cats* by Peggy Wratten. New York: Crown Publishers, n.d.
- The Complete Book of Cat Care* by Leon F. Whitney and George D. Whitney. New York: Doubleday, 1985.
- The Dog For You—America's Most Popular Breeds* by Bob Bartos. New York: NAL, 1980.
- Dog Owner's Home Veterinary Handbook* by Delbert G. Carlson and James M. Griffin. New York: Howell Book House, 1980.
- Enjoying Your Gerbils, Rats and Mice* by Earl Schneider. Harrison, NJ: Sterncos Industries, n.d.
- Guinea Pigs* by Kay Ragland. Neptune, NJ: TFH Publications, 1979.
- Raising Rabbits the Modern Way* by Robert Bennett. Pownal, VT: Storey Communications, n.d.
- Hamsters* by Helga Fritzsche. Woodbury, NY: Barron's Educational Series, 1982.
- How to Raise and Train Gerbils* by D.G. Robinson. Neptune, NJ: TFH Publications, 1984.
- Rabbit Production* by Peter R. Cheeke, et al. 6th ed. Danville, IL: Interstate, 1987.
- Raising Small Meat Animals* by Victor M. Giammattei. Danville, IL: Interstate, 1976.
- The Veterinary Technician in Small Animal Practice* by Cynthia S. Intravartolo and Ralph C. Richardson. Edina, MN: Burgess International, 1983.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service:

- Building Furniture For Your Cats*. A3020.
- Controlling Fleas*. A3210.
- Giving or Receiving Pets—An Owner's Responsibility*. A8M09900.
- Guidelines For Dog House Construction*. A2695.
- Internal Parasites of Dogs*. A2675.
- Raising Guinea Pigs*. AL466.
- Raising Rabbits for Beginners*. A8M00554.

The following are available from the Minnesota Extension Service:

- Heartworm of Dogs*. AG-FS-1219. 1974.
- Toxoplasmosis and Your Cat*. AG-FS-1241. 1981.

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Handling and Restraining Techniques for Pets and Laboratory Animals.* 486X. New York Instructional Materials Service, 1976.

#### Periodicals

*Cat Fancy*  
*Dog Fancy*  
*Dog World*  
*Hounds and Hunting*  
*Pure-Bred Dogs*

#### Computer Software

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Feeds and Feeding* Apple, IBM  
*Micro-Tutor: Meats* Apple, IBM

#### Laboratory Resources

The following is available from Interstate Printers and Publishers, Inc.

*Introductory Laboratory Animal Science.* 2nd ed.

The following is available from Agri-Farm Publications, Inc.

*Small Animal Recordbook*

#### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Animal Bites and Rabies.* 07770 (16mm film, color, 16 minutes). National Audio Visual Center, 1970.

*Gerbils.* 08771 (16mm film, color, 12 minutes). Xerox, 1971.

*Hamsters.* 00829 (16mm film, color, 12 minutes). Xerox, 1971.

The following are available from Nasco.

*Breeds of Dogs, Part I.* C11915N (76-frame color filmstrip with cassette)

*Breeds of Dogs, Part II.* C11916N (80-frame color filmstrip).

The following is available from Ohio Agricultural Education Curriculum Materials Service.

*Breeds of Dogs.* 441X (66 slides with cassette).

The following are available from Photocom.

*Training Your Dog.* 21-1066 (VHS videotape, 61 minutes).

*You and Your Dog.* 21-3002 (VHS videotape, 51 minutes).

*Veterinarian.* 21-216 (VHS videotape, 30 minutes).

The following is available from the University of Wisconsin-La Crosse Film Rental Library.

*Dogs, Cats and Rabbits.* 2L700 (16mm film, color, seven minutes). 1973.

The following is available from the Vocational Education Productions.

*The Small Animal Care Kit.* 470-130G (Kit contains filmstrips, cassette tapes, and scripts about cats, rabbits, dogs, hamsters and guinea pigs, and rats and mice. Each filmstrip also can be ordered separately).

#### Equipment and Facilities

Small-animal waterers

Small-animal feeders

Pet groomer/clipper kit

Hutches or cages with drop trays

Nesting boxes

Veterinary supplies: thermometer, stethoscope, syringes, and needles

## Small Gasoline Engines (15-45 days)

This unit deals with the theory, operation, and maintenance of small gas engines. Topics include career opportunities, tool identification and use, principles of operation for two- and four-stroke engines, preventive maintenance, repair, and the use of shop manuals and part books.

### *Objectives*

- To acquaint students with employment information and career opportunities in the small gasoline engine industry
- To increase student awareness of the proper care and use of shop tools
- To emphasize to students the need for adherence to safety guidelines when working with tools and machinery
- To increase student understanding of the basic mechanical principles of internal combustion engines
- To develop student understanding of the main systems and components of gasoline engines and their functions
- To provide students with an opportunity to practice skills needed in working with small gasoline engines
- To increase student ability to use reference manuals and other written materials in performing maintenance and repair on small gasoline engines

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information such—as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the small gas engine industry—and relate it to their personal needs and aspirations;
- name and correctly use tools and instruments for working on small gasoline engines;
- identify types of fasteners and threads;
- torque various types of fasteners to specifications;
- explain and demonstrate procedures for cleaning and conditioning shop equipment and tools;
- follow and appreciate the need for safety guidelines;
- explain small gas engine components, terminology, and principles of operation;
- understand the differences between two-stroke and four-stroke engines;
- perform preventive maintenance, overhaul, troubleshooting, repair, and tune-up operations on small gasoline engines;
- demonstrate proper engine starting and operation procedures;
- outline recommended storage procedures for small gasoline engines;
- locate and use reference manuals, catalogs, and records for small gasoline engines;
- perform maintenance and repair operations on various power transmission systems; and
- remove, inspect, and sharpen mower blades.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Shop tool identification and proper application
  - Hand tools
  - Power tools
  - Instrumentation
- Fasteners
  - Fasteners
  - Thread identification
- Shop equipment operation
  - Cleaning equipment
  - Reconditioning equipment
- Shop safety
  - Eye safety and appropriate dress
  - Housekeeping
  - Laboratory rules and attitude
- Principles of operation and identification
  - Four-stroke cycle
  - Two-stroke cycle
- Engine component identification
  - Stationary
  - Moving parts
- Small gasoline engine preventative maintenance programs
  - Cooling systems
  - Engine cleaning procedures
  - Air cleaners and breathers
  - Lubrication systems
  - Fuel selection
    - Use
    - Storage
  - Electrical system
  - Carburetor service
  - Plug service
  - Carburetor service
  - Compression checks
  - Battery service

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- Engine starting and operation
  - Starting procedures
  - Operating procedures
  - Safety
- Engine storage
  - Importance of proper storage
  - Engine protection procedures
- Measuring instruments [Mathematics]
  - Micrometers
  - Calipers
  - Gauges
  - Speed measuring tools
- Service manuals, parts books, and service records
  - Engine specifications
  - Parts catalogs
  - Service and business records
- Diagnostic procedures [Science]
  - Ignition
  - Carburetion
  - Compression
- Maintenance and repair
  - Shop procedures and work quality
  - Starters
  - Ignition systems
  - Fuel systems
  - Valves
  - Cylinders and piston rod assemblies
  - Lubrication systems
  - Cam and crank assemblies
- Power transmission systems
  - V-belts and sheaves
  - Chains and sprockets
  - Gears
  - Bearings
  - Clutches
- Mower blade sharpening
  - Removal and inspection
  - Sharpening and balancing

### *Motivational Activities*

- Take field trips to a small engine manufacturer and a small-engine repair shop.
- Use laboratory time to give students an opportunity to repair small engines.

- Hold troubleshooting contests.
- View films, videotapes, and slides on topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Identify and describe the function of tools and equipment to use with small gasoline engines.
- Describe safety procedures to follow when working with small gasoline engines.
- Identify and describe engine parts and principles.
- Tune up or overhaul an engine in the laboratory.
- Take part in troubleshooting contests.
- Demonstrate how to correctly sharpen lawn mower blades.
- Participate in laboratory lessons on service specification, measuring, and how to order parts.

### *Instructional Materials*

#### **Textbooks and References**

- Air Cooled Engine Mechanics Training Manual.* Milwaukee, WI: Engine Service Association, 1974.
- Chain Saw Service Manual.* 8th ed. Overland Park, KS: Intertec Publishing, 1988.
- Compact Tractor Service Manual.* 2nd ed. Overland Park, KS: Intertec Publishing, 1986.
- Light Utility Tractor Service Manual, Vol. 1.* Overland Park, KS: Intertec Publishing, 1975.
- Outboard Motor Service Manual, Vol. 1.* 10th ed. Overland Park, KS: Intertec Publishing, 1987.
- Outboard Motor Service Manual, Vol. 2.* Overland Park, KS: Intertec Publishing, 1987.
- Small Engines Explained* by Leo Rizzo. Garden City, NY: Bergwall Productions, 1982.
- Small Engines Training Manual* by Howard W. Sams. Danville, IL: Interstate, 1973.
- Small Engines, Operation, Maintenance and Repair.* Athens, GA: American Association of Vocational Instructional Materials, 1987.
- Small Engines Service Manual.* 15th ed. Overland Park, KS: Intertec Publishing, 1986.
- Small Gasoline Engines.* St. Paul, MN: Hobar, 1984.
- Small Tractor Service Manual.* 7th ed. Overland Park, KS: Intertec Publishing, 1988.
- Snowmobile Service Manual.* 10th ed. Overland Park, KS: Intertec Publishing, 1986.

#### **Bulletins and Pamphlets**

The following are available from Briggs and Stratton Corporation.

*General Theories of Operation*  
*Repair Instructions IV*

The following are available from Vocational Agriculture Services.

*Small Engines—Principles of Operation, Trouble Shooting and Tune-up.* U3014.  
*Small Engines—Repair and Overhaul.* U3019.  
*The Two-Cycle Engine.* U3020.

#### **Periodicals**

*Successful Farming*

### Computer Software

The following is available from the American Association for Vocational Instruction Materials.

*Small Gas Engines Parts Identification.* Apple.

The following is available from Hobar Publications.

*Small Gas Engines and Related Review.* Apple, IBM, TRS, Macintosh.

### Laboratory Resources

Service manuals for small gasoline engines

### Films, Videotapes, and Slides

The following are available from Bergwall Productions, Inc.

*Outboard Marine Engines Explained.* (Slidefilm with cassette, four parts).

*Small Engines Explained.* (Slidefilm with cassette, nine parts).

The following are available from Briggs and Stratton Corporation.

*Complete Overhaul, 6 and 8 Cubic Inch Aluminum Alloy Engines.* (Slideset.)

*Engine Check-up Class, 6 and 8 Cubic Inch Aluminum Alloy Engines.* (Slideset.)

*Start, Stop, Store.* (Slideset.)

*Valve and Seat Reconditioning.* (Slideset.)

The following are available from Hobar Publications.

*Battery Ignition System.* 405 (64 color slides with cassette and script, 34 minutes). 1974.

*Carburetor Laboratory.* 404 (56 color slides with cassette, 24 minutes). 1973.

*Chain Saw Maintenance.* 419 (53 color slides with cassette, 16 minutes).

*Magneto Ignition Laboratory.* 402 (48 color slides with cassette and script, 28 minutes).

*Magneto Ignition System.* 403 (69 color slides with cassette and script, 30 minutes). 1973.

*Small Engine Disassembly and Assembly Laboratory.* 409 (80 color slides with cassette and script, 30 minutes). 1975.



## Small Grains (5-15 days)

This unit deals with small grains in Wisconsin. Topics include career opportunities, small grain seed identification, variety selection, soil and climatic requirements, methods of seeding, feed and nutritive values, diseases, pest management, and harvesting.

### Objectives

- To acquaint students with employment information and career opportunities in the small grains industry
- To provide students with practice in identifying and evaluating small grains
- To create student awareness of the climatic and cultural requirements of small grains
- To develop student understanding of the uses of small grains

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the small grains industry—and relate it to their personal needs and aspirations;
- identify seeds of the various small grains;
- grade and evaluate small grains;
- list and discuss the soil and climatic requirements of small grains;
- describe the important uses of commercial and feed small grains;
- select the varieties of grain suited to a particular area;
- explain the cultural practices for small grain production;
- compare weights per bushel, nutritive value, total digestible nutrients (TDN), protein, and bushels per acre; and
- identify five diseases and pests and recommended control measures.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment information
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunity for advancement
  - Other factors
- Identifying and grading small grains [Science]
  - Major small grains
  - Hybrids

- Climatic and soil requirements for small grains [Science]
- Importance and uses of small grains and marketing [Social Studies]
- Cultural practices [Science]
  - Seed treatment and testing
  - Seedbed preparation
  - Time of planting
  - Rate of seeding
  - Drilling
  - Serial planting
  - Yields and weights
  - Storage and marketing
- Pests and pest control
  - Pest identification
    - Insects
    - Diseases
    - Weeds
    - Other
  - Pest control
    - Insecticides
    - Resistant varieties
    - Herbicides
    - Other pesticides

### *Motivational Activities*

- Take field trips to area farms and grain elevators or houses.
- View films, videotapes, and slides on diseases and pests of small grains.
- Post bulletin board displays featuring topics related to small grains.
- Visit demonstration plots for small grains.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Collect and identify small grain samples.
- Prepare mounts of small grains.
- Collect and display head samples of diseased small grains.
- Plant and maintain a plot of small grain to demonstrate correct planting, fertilizing, and pesticide use techniques.
- Research and report on methods of storing small grains.
- Review statistical reports on small grains.

## *Instructional Materials*

### **Textbooks and References**

- Approved Practices in Crop Production* by Elwood A. Brickbauer and William P. Mortenson. 2nd ed. Danville, IL: Interstate, 1978.
- Cereal Pests and Diseases* by R. Gair et al. 3rd ed. Alexandria Bay, NY: Diamond Enterprises, 1983.
- Crop Production* by Richard Delorit and Louis Greub. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Crop Production: Principles and Practices* by Darrel S. Metcalfe and Donald M. Elkins. 4th ed. New York: Macmillan, 1984. Available from Nasco.
- Hunger Signs in Crops*. Edited by Howard B. Sprague. 3rd ed. New York: David McKay, 1964.
- Producing Farm Crops* by Harold K. Wilson et al. 3rd ed. Danville, IL: Interstate, 1981. Available from National Farm Book Company.

### **Pamphlets and Bulletins**

The following are available from the Cooperative Extension Service.

- The Buckthorn Menace to Oat Production* (1979). A2860.
- Field Bindweed—Prevention and Control*. NCR206.
- Forage and Small Grain Pest Management in Wisconsin* (1988). A1981.
- Intensive Wheat Management* (1985). A3337.
- Oats for Forage*. A2590.
- Pest Management in Stored Grain* (1982). AL569.
- Rust Diseases of Oats* (1978). A2948.

### **Periodicals**

- Doane's Agricultural Report*
- Drovers Journal*
- Farm Journal*
- Successful Farming*
- Wisconsin Agriculturist*

### **Computer Software**

The following are available from Hobar Publications.

- Grain Marketing*. Apple, IBM.
- Crop Chemicals and Related Review*. Apple, IBM, TRS, Macintosh.
- Crop Decision Aids*. Apple, IBM.
- Grain Farm Operation*. Apple.
- Planting and Seeding Equipment and Related Review*. Apple, IBM, TRS, Macintosh.
- Substitute Teacher Vol. 5*. Apple.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Crops Management.* Apple, IBM.

*Agri-Quiz: Small Grains.* Apple, IBM.

The following is available from Photocom.

*Crop Management Utilities.* Apple.

### Laboratory Resources

The following are available from Ohio Agriculture Education Curriculum Materials Service.

*Approved Practices for Small Grains.* 103X. 1978.

*Field Crop Nutrition—Student Manual.* 1004M. 1978.

*Marketing Farm Grain Crops—Student Manual.* 1037M. 1988.

*Marketing Farm Grain Crops—Teacher Guide.* 1036G. 1988.

### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Seeds of Plenty.* 07696 (16mm film, color, 18 minutes). Wisconsin Crop Improvement Board, 1970.

*Seeds of Tomorrow.* 11062 (VHS videotape, color, 58 minutes). Coronet, 1985.

*Wheat from Field to Flour.* 09243 (16mm film, color, 11 minutes). Centron, 1973.

*Who Shall Reap?* 04383 (16mm film, color, 28 minutes). United States Department of Agriculture, 1969.

The following are available from Hobar Publications.

*Crop Seed Identification.* D1 (105 slides with cassette, 28 minutes).

*Field Crops.* D27 (87 slides).

*Identification and Control of Common Crop Insects.* D12 (49 slides with cassette, 21 minutes).

*Symptomology and Control of Common Crop Diseases.* D13 (107 slides with cassette, 56 minutes).

The following are available from Photocom.

*Managing the Established Crop for Maximum Profit.* 30-694 (VHS videotape, 30 minutes).

*Seeding and Establishing a Feed Grain Crop.* 30-693 (VHS videotape, 30 minutes).

### Equipment and Facilities

Sample mounts for collections

Seed samples for small grains

## Soil Science—Advanced (12-45 days)

This unit deals with advanced aspects of soil science. Topics include career opportunities, soil characteristics, soil conservation, fertilizer use, land management, soil development, and soil chemistry and structure.

### Objectives

- To acquaint students with employment information and career opportunities in the soil science industry
- To develop student appreciation of the value of soil as a natural resource
- To develop student understanding of how soils develop
- To familiarize students with the language of soil science
- To provide students with instruction and practice in recognizing differences among soils
- To assist students in recognizing ways of reducing soil losses
- To enhance student ability to make reasoned judgments concerning appropriate land use
- To develop student understanding of how to use fertilizers effectively, efficiently, and properly
- To increase student awareness of the value of animal manure as a fertilizer
- To illustrate to students the relation of soil chemistry, structure, and water retention to plant growth

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in soil science—and relate it to their personal needs and aspirations;
- explain the value of soil as a resource and its relationship to the community;
- describe the processes by which soil forms and ages;
- explain the major categories used to describe and classify soil;
- understand the soil science terminology;
- differentiate soil structure, texture, and color;
- describe various soil conservation practices;
- identify the best use of soils in the area;
- determine the amount and kind of fertilizer to be applied in a given situation;
- recognize sources of soil nutrients;
- explain major and minor nutrients in soils;
- evaluate fertilizer on an elemental and oxide form and compare on a cost per unit basis;
- explain how fertility is lost and why certain nutrients leach more readily than others; and
- understand the effect of pH on nutrient availability.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions

- Training requirements
- Working conditions
- Opportunities for advancement
- Other factors
- Development of soils [Science]
  - As a result of water, wind, glaciers, forest, and grasses
  - The great orders of soil
  - Characteristics of a soil horizon
  - Major factors used in describing soils and soil horizons
  - Soil groups found in the United States and their development and characteristics
  - Soil chemistry
- Organic matter and its relationship to soil fertility [Mathematics, Science]
  - Definition and composition of organic matter
  - The importance of organic matter
  - Methods used to increase or maintain the organic matter of the soil
  - The carbon-nitrogen ratio
- Life found in the soil [Science]
  - Importance of microorganisms
  - Kinds of microorganisms
  - Other forms of life
  - The nitrogen fixation process
  - The process of inoculating legumes
  - Benefits derived from inoculating legumes
  - Harmful effects of soil microorganisms
  - Factors which favor the growth and activity of soil microorganisms
  - Soil management practices and microorganism activity
  - Higher animal life and its effect on soil
- Water in the soil [Mathematics, Science]
  - The importance of water in soil formation and plant growth
  - Types of water
  - Water entrance and movement
  - Adhesion and cohesion
  - Classes of soil water and plant availability
  - Water-holding capacity
  - Methods used to determine the moisture content
  - The importance of proper water management
  - Methods of increasing available water to crops
  - Methods used to reduce water losses from soil
- Plant growth [Science]
  - The life process of plants
  - Components of a cell (composition and function)
  - Plant functions
    - Photosynthesis
    - Transpiration

- Respiration
- Digestion
- Assimilation
- Growth and reproduction
  - Functions of the root system
  - Development of roots
  - Types of root systems
  - Extent of the root system
  - Types and functions of stems
- Environment and its effect on plant growth [Mathematics, Science]
  - Heredity factors
  - Crop environment
    - Effects of light
    - Effect of temperature on plant growth
    - Plant growth in relationship to soil moisture
    - Effect of humidity, precipitation, and wind on plant growth
    - The need for air in the soil
    - Effect of soil texture, structure, fertility, and soil reaction on plant growth
    - Effect of weeds on plant growth
    - The effect of insects and diseases on plant growth
- Elements necessary for plant growth [Science]
  - Elements obtained from the air
  - Elements obtained from water
  - Elements obtained from soil
    - Major elements
      1. nitrogen
      2. phosphorous
      3. potassium
      4. calcium
      5. magnesium
    - Trace elements
      1. iron
      2. boron
      3. manganese
      4. copper
      5. molybdenum
      6. chlorine
- Soil reaction and liming [Mathematics, Science]
  - Ionization of molecules
  - Identify ions, molecules, electrons, and cations
  - Soil acidity and alkalinity
  - Colloids and soil reaction
  - Soil reaction testing
  - The development of acid and alkaline soils
    - Range of reaction in soils
    - Seasonal effects on soil acidity

- Soil reaction and its effect on plant growth
  - Plants that favor a weak acid or neutral soil
  - Plants that tolerate a moderately acid soil
  - Plants that tolerate an acid soil
- Liming the soil
  - Ways liming material becomes deficient in soil
  - Function of lime in the soil
  - Benefits derived from adding lime to the soil
  - Calcium equivalents in lime and soil acidity
  - Application of liming materials
    1. time of application
    2. method of application
    3. rate of application
    4. factors that determine the amount of lime needed to obtain the desired pH
- Commercial fertilizers [Mathematics, Science]
  - Reasons for applying commercial fertilizers
  - Types available
  - How commercial fertilizers are sold
  - Fertilizer grades
  - Guaranteed analysis information
  - Major and minor elements in commercial fertilizers
  - Amount of commercial fertilizer to apply
    - Rates for maximum yields
    - Rates for maximum profits
  - Time of application
  - Fertilizer placement
    - Banding
    - Side dressing
    - Drilling in with the seed
    - Plow sole application
    - Broadcasting
    - Spreading with manure
  - Kinds of commercial fertilizer
    - Nitrogen fertilizer
      1. sulfate of ammonia
      2. nitrate of soda or sodium nitrate
      3. ammonium nitrate
      4. anhydrous ammonia
    - Phosphate fertilizers
      1. rock phosphate
      2. super phosphate
    - Potash fertilizers
      1. nitrate of potash
      2. sulfate of potash
  - State laws that apply to commercial fertilizers



- Animal manure and the effect on soil fertility [Mathematics, Science]
  - Value of manure in maintaining soil fertility
  - Fertilizer content of manure produced by farm animals
    - Cattle
    - Hogs
    - Sheep
    - Horses
  - Bedding and feed effect on fertilizer content of manure
  - Conservation methods for barnyard manure
  - Methods of handling manure
  - Methods of applying manure
  - Rates of application
  - Crops and soils that benefit most from a manure application
- Land drainage and its effect on land use [Mathematics, Science]
  - Effects resulting from too much water and prolonged wetness
    - Root growth
    - Tilth
    - Cultural practices
    - Cost
  - Drainage methods
    - Surface drainage
      1. system of ditching and design
      2. effectiveness
      3. soil cover, land slope, and condition of soil
      4. preventing erosion
      5. ditch construction
    - Subsurface drainage
      1. where used
      2. types of systems
      3. tile
        - location of drains
        - size of tiles
        - selection
        - construction of tile drains
        - depth and spacing of tile
  - Maintaining drainage systems
    - Importance of keeping ditches free of refuse, weeds, trash, brush, and silt
    - Sod outlet ditches and maintenance costs
    - Inspection and care of tile drainage systems
    - Effects of continuous cropping on tile drainage systems
- Soils and water conservation [Mathematics, Science, Social Studies]
  - Types of erosion
    - Wind
    - Water
  - Changes in the landscape due to erosion
  - Agricultural practices that increase erosion
    - Overgrazing

- Plowing up and down the slope rather than on the contour
- Tilling soil of low fertility
- Failing to maintain adequate organic matter content
- Removing natural vegetation from the forest
- Exposing soil on sloping land
- Breaking up land susceptible to erosion
- Tillage methods
  - Conventional moldboard plow
  - Conservation tillage
    1. no tillage or zero tillage
    2. ridge planting
    3. strip tillage
    4. chisel plowing
    5. plow plant
    6. wheel track plant
- Effects from erosion
  - Reduced crop yields
  - Greater need for commercial fertilizer
  - Crops of lower nutritive value
  - Loss of topsoil
  - Formations of ditches and gullies
  - Siltation of lakes and streams
  - Covering topsoil with lower fertility soils from highlands
- Extent of erosion in the United States
  - Land area of the United States
  - Percent damaged by erosion
  - Losses caused by erosion
- Conservation programs in the United States
  - Historical background
  - Present soil and water conservation activities
    1. soil conservation districts (function and operation)
    2. assistance provided by business and industry
    3. grassland farming
    4. tree farming (shelterbelts, windbreaks, and woodlots)
    5. terracing
    6. strip cropping
    7. land forming
    8. crop rotation
    9. ponds and dams
- Ecology and its relationship to soil use [Mathematics, Science]
  - The ecosystem
    - Members of the ecosystem
    - Checks and balances
    - The effect of change
  - People and the soil
    - Humans' effect on the soil
    - Reaction of the soil to humans' presence
  - Balance of nature

### *Motivational Activities*

- Take field trips to
  - a watershed management area,
  - wildlife conservation areas, and
  - local farms to view the conservation practices being used.
- Invite resource people, such as representatives from the Soil Conservation Service and the state parks department, to give class presentations.
- Post bulletin board displays on topics related to this unit.
- View slides of glaciation and glacial features.
- Demonstrate the properties of pure phosphorus and potassium.
- Conduct soil tests and other laboratory experiments on soil.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- List the conservation efforts practiced at your home or at an agricultural setting and devise a plan for improving on those efforts.
- Collect and test soil samples.
- Experiment with fertilizer on test plots and report on your findings.
- Evaluate a conservation plan of your Soil Conservation Service district.
- Develop a plan for your district.
- Participate in local and state land judging contest.
- Titrate a sample of lime.
- Use a sample soil report and write recommendations for corrective maintenance applications.
- Complete work sheets on fertilizer calculations.
- Collect and display plant specimens that show nutrient deficiencies.
- Demonstrate how to calibrate the fertilizer applicator in a corn planter and a broadcast fertilizer applicator.

### *Instructional Materials*

#### **Textbooks and References**

- Approved Practices in Soil Conservation* by Duane A. Bosworth and Albert B. Foster. 5th ed. Danville, IL: Interstate, 1983. Available from National Farm Book Company.
- Fundamentals to Soil Science* by Henry D. Foth. 7th ed. New York: John Wiley and Sons, 1984. Available from National Farm Book Company.
- Our Soils and Their Management* by Roy L. Donahue, Roy H. Follett, and Rodney L. Tulloch. 5th ed. Danville, IL: Interstate, 1983.
- Profitable Soil Management* by Leo L. Knuti. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Soil and Soil Management* by Charles Sopher and Jack Baird. 3rd ed. Reston, VA: Reston Publishing, 1986. Available from National Farm Book Company.
- Soil and Water Conservation* by Frederick B. Troeh. Englewood Cliffs, NJ: Prentice Hall, 1980. Available from National Farm Book Company.
- Soil Science Simplified* by Milo I. Harpstead, Francis D. Hole, and William Bennett. Ames, IA: Iowa State University Press, 1988. Available from National Farm Book Company.

*Soils: An Introduction to Soils and Plant Growth* by Roy L. Donahue and John Miller. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1983. Available from National Farm Book Company.

*Using Commercial Fertilizers* by Malcolm H. McVickar and William M. Walker. 4th ed. Danville, IL: Interstate, 1978.

*The Western Fertilizer Handbook*. 7th ed., rev. Fresno, CA: Thomson Publications, 1986.

### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Aglime—Key to Increased Yield and Profits*. A2240.

*Biological Inoculants and Activators: Their Value to Agriculture*. NCR168.

*Compendium of Research Reports on Use of Non-Traditional Materials for Crop Production—Supplement 1*. A9NTM-1.

*Fertilizer Value of Swine Manure*. PIH25.

*Grow Legumes for Green Manure*. A2477.

The following is available from *Successful Farming* magazine.

*Conservation Tillage Guide*

### Periodicals

*Ag Consultant*

*Agricultural Research*

*Crops and Soils*

*Doane's Agricultural Report*

*Farm Journal*

*Journal of Soil and Water Conservation*

*Successful Farming*

### Computer Software

The following are available from Agri-Education, Inc.

*AgLime*. Apple, IBM.

*Common Sense Conservation*. Apple, IBM.

The following is available from Fred's Micro-ware.

*Field File*. Apple, IBM.

The following are available from Hobar Publications.

*Soil Conservation and Surveying and Related Review*. Apple, IBM, TRS, Macintosh.

*Soil Evaluation, Fertility and Related Review*. Apple, IBM, TRS, Macintosh.

*Substitute Teacher—Vol. VI: Fertilizers*. Apple.

*Tillage and Related Review*. Apple, IBM, TRS, Macintosh.



The following are available from Mid States Agri-Technology Associates, Ltd.

*Fertilizer Cost per Acre Formulator Program.* Apple.

*Micro-Tutor: Conservation.* Apple, IBM

*Micro-Tutor: Soil Science.* Apple, IBM

*Soil Test Interpreter.* Apple, IBM

The following is available from Midwest Agribusiness Services Inc.

*Agri-Quiz: Soils.* Apple, IBM

#### Laboratory Resources

The following are available from the National Vocational Agriculture Book Company:

*Crop and Soil Science Student Study Manual*

*Vocational Agriculture Soil Management Manual*

#### Films, Videtapes, and Slides

The following are available from the Bureau of Audio Visual Instruction

*Runoff—Land Use and Water Quality.* 01765 (16mm film, color, 22 minutes). University of Wisconsin, Department of Agricultural Journalism, 1978.

*Soil and Soil Surveys of Wisconsin.* (VHS videotape, color, Part I—20 minutes, Part II—20 minutes). University of Wisconsin-Stevens Point, 1983.

*Water Movement in Soil.* 03360 (16mm film, color, 27 minutes). University of Washington, 1961.

The following is available from Cornell University

*Potassium for Agriculture.* (16mm film, color, 24 minutes.) 1979.

The following is available from Vocational Agriculture Services

*Collecting and Preparing Soil Samples for Testing.* ST03a (36 slides) or F703a (36-frame filmstrip). 1964.

The following are available from Vocational Education Productions

*The Western Fertilizer Handbook Slideset Series.* 1-580-101H (Set of eight slidesets). Individual slidesets from the series also may be ordered, titles and order numbers are as follows:

"Benefits of Fertilizer." 1-580-612H (14 color slides).

"Essential Plant Nutrients." 1-580-604H (56 color slides).

"Fertilizer Formulation, Storage and Handling." 1-580-606H (26 color slides).

"Fertilizers—A Source of Plant Nutrients." 1-580-605H (29 color slides).

"Methods of Applying Fertilizer." 1-580-610H (22 color slides).

"Soil—A Medium for Plant Growth." 1-580-601H (39 color slides).

"Soil Organic Matter." 1-580-608H (17 color slides).

"Soil and Tissue Testing." 1-580-609H (26 color slides).

The following are available from Vocational Media Associates.

*Conservation Tillage.* 300798-93 (Filmstrip or slides with cassette and program guide).

*Soil: Its Meaning for Man.* 30919-93 (Two-parts, filmstrip with cassette and program guide).

*Soil Testing—Where the Yield Begins.* 31339-93 (Videotape). Farmland Industries, n.d.

*Soil: The Growth Medium.* 30194-93 (Filmstrip with cassette, program guide, and masters).

#### Equipment and Facilities

Munsell color book

Sacks for sampling

Sample of soil profiles of area soils

Small pail or pan for mixing

Soil auger or soil spade

Soil pit in area

Soil sampling tube

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## Soil Science—Beginning (20-30 days)

This unit deals with factors involved in soil science in Wisconsin. Topics include career opportunities, origin of soil, determining soil fertility through testing, fertilizer analysis, land capability, soil mapping, and soil conservation.

### *Objectives*

- To acquaint students with employment information and career opportunities in the soil science industry
- To develop student understanding of soil origin, composition, and the relationship between plants and soils
- To provide students with instruction and practice in recognizing differences in soil structure, texture, and color
- To help students assess the importance of commercial fertilizers to agriculture
- To develop student awareness in the benefits of soil testing
- To provide students with guidelines on how to submit representative soil samples to a soil testing laboratory
- To help students distinguish between soil testing, fertilizer analysis, and fertilizer application rates
- To develop student understanding in the basic principles of effective land use
- To assist the students in recognizing the need for soil conservation
- To provide students with opportunities to design a basic soil conservation plan

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the soil science industry—and relate it to their personal needs and aspirations;
- explain the process of soil formation and soil development;
- identify and explain the various properties of soil;
- describe the impact of commercial fertilizers on American agriculture;
- explain the rationale for soil testing;
- describe soil testing procedures;
- demonstrate proper soil sampling procedures;
- interpret parts of a fertilizer label;
- calculate fertilizer application rates;
- read a soil map;
- describe proper land use applications for each soil capability class;
- describe the categories and the undesirable consequences of soil erosion;
- identify and evaluate soil conservation tillage practices;
- design a basic soil conservation plan; and
- list and describe the various components of the soil loss equation.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job description
  - Training requirements
  - Working conditions
  - Opportunity for advancement
  - Other factors
- Origin of the soil [Science]
  - Soil definition
  - The process of soil formation
  - Materials and processes of soil development
  - Movement of soil materials by glaciers, water, wind, and gravity
  - Shapes and sizes of structural soil units
  - Soil properties (texture, structure, and tilth)
  - Soil chemistry
- Determining soil fertility through testing [Science]
  - Purpose of using a soil test
  - Reasons for testing the soil
  - Reliability of soil tests
  - Tests used for determining various soil nutrients
  - Soil sampling procedures
    - Importance of obtaining a representative sample
    - Procedure for obtaining a representative sample
    - Equipment needed for soil sampling
    - Recordkeeping
  - Availability and reliability of soil testing kits
  - Interpretation of computer processed soil testing records
  - Land judging
- Fertilizers [Science]
  - Basic types
  - Fertilizer labels
    - Information on the label
    - Interpretation of information
  - Application of fertilizer
- Land capability [Science]
  - The eight soil classifications and their characteristics
  - Relating soil classification to land use
- Percolation test [Science]
- Soil mapping [Science]
  - The need for soil maps
  - Procedure for mapping soil
  - Manner in which soil maps are used

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- Soil conservation [Science]
  - Importance of conservation
  - Conservation tillage methods
  - Soil erosion and pollution problems

### *Motivational Activities*

- Take a field trip to observe varying degrees of soil erosion, to view soil conservation practices implemented to reduce erosion, and to collect soil samples.
- Set up demonstrations showing soil porosity, capillary action, osmosis, organic matter, and water run-off.
- Invite a representative from the Soil Conservation Service to give a class presentation.
- Post bulletin board displays featuring topics related to this unit.
- View films, videotapes, and slides on soil science.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Demonstrate how to use soil analysis sieves.
- Take a soil sample, record the necessary information, and send it to a state soils laboratory for evaluation. Give a report on the results.
- Locate a parcel of agricultural land on a soil map. Using information from the map—including the major soil types on the land, percent erosion, and slope—determine the best agricultural use for each soil type.
- Conduct soil tests in the school laboratory.
- Organize or take part in a soil judging contest on the school grounds.
- Set up a display of several soil textures in the school laboratory.

### *Instructional Materials*

#### **Textbooks and References**

- Fundamentals of Soil Science* by Henry D. Foth. 7th ed. New York: John Wiley and Sons, 1984. Available from National Farm Book Company.
- Profitable Management of Wisconsin Soils* by L.M. Walsh. Madison, WI: American Publishing, 1972.
- Soil Physics* by Leonard D. Baver et al. New York: John Wiley and Sons, 1972.
- Soils: An Introduction to Soils and Plant Growth* by Roy L. Donahue and John Miller. Englewood Cliffs, NJ: Prentice Hall, 1983. Available from National Farm Book Company.

#### **Bulletins and Pamphlets**

The following is available from the Cooperative Extension Service.

*Sampling Soils for Testing*. A2100.

*Soil Guide for Wisconsin Land Lookers*. G2822.

The following are available from the Wisconsin Department of Agriculture, Trade and Consumer Protection.

*Land Capability Classification*. Ag Handbook #210.

The following is available from *Successful Farming* magazine.

*Conservation Tillage Guide*

#### Periodicals

*Crops and Soils*

*Crop Science*

*Farm Journal*

*Journal of Agronomic Education*

*Journal of Environmental Quality*

*Journal of Soil and Water Conservation*

*Soil Science Society of America Journal*

*Successful Farming*

*Wisconsin Agriculturist*

#### Computer Software

The following are available from Agri-Education, Inc.

*Aglime*. Apple, IBM.

*Common Sense Conservation*. Apple, IBM.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Conservation*. Apple, IBM.

*Micro-Tutor: Soil Science*. Apple, IBM.

*Soil Test Interpretor*. Apple, IBM.

The following is available from Midwest Agribusiness Services, Inc.

*Agri-Quiz: Soils*. Apple, IBM.

#### Laboratory Resources

The following are available from the National Vocational Agriculture Book Company

*Crop and Soil Science Student Study Manual*

*Vocational Agriculture Soil Management Manual*

### Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Water Movement in Soil.* 0336 (16mm film, color, 27 minutes). University of Washington, 1961.

The following is available from Cornell University.

*Potassium for Agriculture.* (16mm film, color, 24 minutes.) 1979.

The following is available from Vocational Agriculture Services.

*Collecting and Preparing Soil Samples for Testing.* F703a (36-frame filmstrip) or S703a (36 slides). 1964.

The following is available from Vocational Media Associates.

*Conservation Tillage.* 300798-93 (Filmstrip or slides with cassette and program guide).

### Equipment and Facilities

Local soil profiles  
Munsell color book  
Sacks for sampling  
Small pot or pan for mixing  
Soil analysis sieves  
Soil auger or soil spade  
Soil pit in your area  
Soil sampling probe  
Spray bottles

## Soybeans (10-20 days)

This unit deals with the production of soybeans. Topics include career opportunities, the importance of soybeans, seed selection, growth, production techniques, harvesting, production economics, and marketing factors and methods.

### *Objectives*

- To acquaint students with employment information and career opportunities in the soybean science industry
- To create student awareness of the importance of soybeans as a food stuff and feed for livestock
- To provide students with a basis for selecting an appropriate soybean variety for a given area
- To develop student understanding of approved soybean production techniques
- To create student understanding of the factors that affect yields and costs in soybean production
- To develop student understanding of soybean marketing methods

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the soybean industry—and relate it to their personal needs and aspirations;
- understand the importance of soybeans as a protein energy source;
- list and explain various uses of soybeans;
- choose recommended varieties for their area;
- identify and label soybean plant parts;
- explain the function of each plant part;
- describe the changes that take place during each growth stage;
- explain the pollination and fertilization process in soybeans;
- list the macro- and micronutrients required by soybeans and the functions of each;
- explain why it's beneficial to inoculate and the procedures involved;
- compare soil preparation methods for soybean production;
- identify agricultural implements used in soybean production;
- select proper seeding methods;
- contrast the methods of herbicide application;
- compare various insecticides and herbicides recommended for soybean production;
- determine when to harvest soybeans and choose an appropriate drying process;
- calculate the cost of producing a bushel of soybeans, machinery cost per acre, and labor and management wage per acre;
- calculate yield in bushels per acre, including seeding rate, plant population, fertilizer rate, and harvesting loss;
- discuss the factors restricting soybean yields and corrective measures for each;
- contrast methods of soybean marketing;
- describe the effect of photoperiod response in soybean varietal selection; and
- compare various methods and implements for producing soybeans.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunity for advancement
  - Other factors
- Importance of soybeans [Social Studies]
  - Local
  - State
  - Global
  - General and specific soybean uses
- Seed selection [Science]
  - Growing season
  - Climatic conditions
  - Varieties
- Soybean growth [Science]
  - Soybean plant parts and functions
  - Nutrient requirements
  - Inoculation
- Production techniques [Science]
  - Soil type
  - Seedbed preparation
  - Production implements
  - Seeding rate
  - Planting and cultivation procedures
  - Fertilization of soybeans
  - Herbicides and common weed identification
  - Insecticides and common insect identification
  - Harvesting and drying soybeans
- Soybean management [Mathematics, Social Studies]
  - Machinery costs
  - Labor requirements
  - Plant population
  - Yields
  - Harvesting losses
  - Cost per bushel
  - Factors restricting soybean yields
  - Innovative practices in soybean production
- Marketing soybeans [Mathematics, Social Studies]
  - Soybean storage

- Hedging and futures marketing
- Quality factors

### *Motivational Activities*

- Take field trips to soybean growers' farms and demonstration plots.
- Post charts, posters, and bulletin board displays featuring soybeans.
- View films, videotapes, and slides on topics related to this unit.
- Display food products made from soybeans.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Student the characteristics of different varieties of soybeans.
- Collect and prepare mounts of
  - healthy soybean plants and seeds,
  - diseased plants, and
  - insects that attack soybeans.
- Monitor the market's cash and futures prices for soybeans and plot them on a graph.
- Perform germination tests on different varieties of soybean seeds.
- Set up demonstration plots using different seedbed preparations, pesticides, and fertilizer applications. Record and report the results.

### *Instructional Materials*

#### Textbooks and References

- Approved Practices in Crop Production* by Elwood A. Brickbauer and William P. Mortenson. 2nd ed. Danville, IL: Interstate, 1978.
- Crop Production* by Richard J. Delorit and Louis Greub. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Modern Soybean Production* by Walter O. Scott and Samuel R. Aldrich. 2nd ed. Danville, IL: Interstate, 1981.
- Producing Farm Crops* by Harold K. Wilson et al. 3rd ed. Danville, IL: Interstate, 1981.
- The Soybean Book* by Phyllis Hobson. Charlotte, VT: Garden Way Publishers, 1978.

#### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Brown Stem Rot of Soybean.* A3171.
- Pest Management in Wisconsin Soybeans—1987.* A2782.
- Phytophthora Stem and Root Rot of Soybean.* A3016.
- Sclerotinia Stem Rot (White Mold) of Soybean.* A3172.
- The Soybean Cyst Nematode.* A3092.
- Soybean Diseases I.* A7800605.
- Soybean Diseases II.* A7800606.

The following is available from Teaching Aids, Inc.

*Hedging—Corn and Soybean*

#### **Periodicals**

*Crops and Soils*

*Soybean Digest*

#### **Computer Software**

The following are available from Hobar Publications.

*Corn and Soybean Review.* Apple, IBM, TRS, Macintosh.

*Modern Soybean Production Review.* Apple, IBM, TRS, Macintosh.

*Soybean Cost Per Acre.* Apple, IBM, TRS.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Soybean Production.* Apple, IBM.

#### **On-line Computer Networks**

The following is available from Ag Ed Network, AgriData Resources, Inc.

*Basis for Soybeans.* HS557.

*Cash Soybean Market Values.* ADN18.

*Cash Soybean Prices.* HS265.

*Cost of Producing Soybeans.* HS194.

*Markets for Soybeans.* HS260.

*Seasonal Value: Stored Soybeans.* HS269.

#### **Laboratory Resources**

The following are available from Interstate Printers and Publishers, Inc.

*Diseases of Soybeans and Corn.* 2587.

*Insect Pest Identification of Corn, Soybeans, and Alfalfa.* 2229.

The following is available from National Farm Book Company

*Crop Science and Food Production Workbook*

#### **Films, Videotapes, and Slides**

The following is available from the Bureau of Audio Visual Instruction.

*Soybeans—The Magic Beanstalk.* 01905 (16mm film, color, 12 minutes). Centron Films, 1975.

The following is available from Hobar Publications.

*Corn and Soybean Seedling Emergence*. D4 (VHS videotape, 15 minutes).

The following is available from Modern Talking Picture Service, Inc.

*Soybeans—Food, Feed, and Future*. 16204 (16mm film, color, 20 minutes). Pioneer Hi-Bred International, n.d.

The following is available from Teaching Aids, Inc.

*Scouting for Green Clover Works on Soybeans*. R-75207 (VHS videotape, five minutes).



## Sunflowers (7-13 days)

This unit deals with sunflower production in Wisconsin. Topics include career opportunities, important growing areas, production costs and returns, cultural practices, sunflower types and varieties, disease control, sunflower uses, harvesting methods, storage, and marketing.

### Objectives

- To acquaint students with employment information and career opportunities in the sunflower industry
- To develop an understanding of the history and current status of sunflower production in the state and nation
- To provide information on how to assess the feasibility of producing sunflowers
- To enhance awareness of the common types of sunflowers and their uses
- To develop an understanding of approved practices used in sunflower culture
- To increase awareness of the marketing procedures for sunflowers

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the sunflower industry—and relate it to their personal needs and aspirations;
- identify the important and ideal growing areas for sunflowers, in both the United States and Wisconsin;
- calculate production costs and returns per acre for raising sunflowers;
- identify the types and varieties of sunflowers that are practical for growing in Wisconsin;
- develop a plan for planting, fertilizing, and irrigating sunflowers;
- develop a plan for pest control including diseases, insects, weeds, and birds;
- discuss the different uses, methods of harvesting, and storage of sunflowers; and
- explain market locations, market demands for the area, and the complete marketing process for sunflowers.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Sunflower production history and growing regions

- Sunflower production factors in Wisconsin
- Sunflower types and varieties
  - Oilseed
  - Birdfeed
  - Human consumption
- Sunflower culture [Mathematics, Science]
  - Climate and soil requirements
  - Seedbed preparation
  - Planting
    - Date
    - Depth
    - Row width and plant population
  - Fertilization
  - Irrigation
  - Weed control
  - Insect control
  - Disease control
  - Bird control
  - Harvesting and storage
    - Grain
      1. desiccation
      2. harvesting
      3. drying
      4. storage
      5. seed grain standards
    - Silage
      1. corn feed value comparison
      2. alfalfa/haylage feed value comparison
- Marketing [Social Studies]
  - Sunflower demand
  - Relationship to production area
  - Futures market versus cash market

### *Motivational Activities*

- Take a field trip to a local sunflower grower, sunflower processor, or an experimental farm.
- Arrange for the class to attend Farm Progress Days.
- Plan sunflower test plots and nutritive value tests.
- Post bulletin board displays featuring topics related to this unit.
- View films, videotapes, and slides on sunflowers.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.

## *Instructional Materials*

### **Textbooks and References**

*Sunflower Science and Technology* by Jack Carter. Madison, WI: American Society of Agronomy, 1978.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Crop Record Book*. A2294

*Field Development of the Sunflower*. NCR161

*Pest Control in Sunflower*. A3075

*Sunflower Production in Wisconsin*. A3005

### **Periodicals**

*Crops and Soils*

*Sunflower*

### **Computer Software**

The following are available from Hobar Publications:

*Field Inventory*. Apple, IBM, TRS

*Crop Decision Aids*. Apple, IBM

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Crop Enterprise Selection*. HSL32

*Crop Production*. ADN57

*Plant Science*. CLF300

### **Films, Videotapes, and Slides**

The following is available from Hobar Publications:

*Field Crops*. D27 (87 slides with cassette).

## **Supervised Agricultural Experience (SAE) Programs—Agribusiness**

This unit deals with the Supervised Agricultural Experience (SAE) program relating to agribusiness occupations. Topics include the value and usefulness of accurate records, using resource materials in choosing a career, salesmanship, and career opportunities.

### *Objectives*

- To emphasize to students the value of SAE programs as means of acquiring and integrating knowledge and skills concerning careers in agribusiness
- To help students relate educational and job experience requirements to specific agribusiness jobs and careers
- To assist students to articulate a tentative career interest and identify learning goals related to that interest
- To facilitate student inquiry into better ways to make use of resources available for making and pursuing career choices
- To develop student appreciation of the value of recordkeeping as a learning and management tool
- To enhance student ability to keep accurate and useful records
- To prepare students to negotiate an acceptable agreement covering the terms of their supervised agricultural experience
- To assist students to identify skills and understanding they acquired from their Supervised Agricultural Experience program

### *Competencies*

At the conclusion of this unit, students will be able to

- explain the need and value of Supervised Agricultural Experience programs;
- develop an understanding of the requirements of specific occupations in the field of agriculture/agribusiness;
- prepare a written commitment on a career interest and goals that relate to their Supervised Agricultural Experience program;
- identify resources available for the development of a satisfactory SAE program;
- become aware of the importance of good records;
- understand the requirements of records and relate them to their SAE program;
- learn the various terms used in recordkeeping;
- develop an appropriate agreement designed to meet the needs of the student, parents, instructor, and employer;
- understand the importance of a financial statement and what it includes;
- prepare appropriate forms required for filing income taxes;
- develop the skills necessary to record competencies gained as the result of classroom and laboratory instruction in agribusiness;
- prepare an inventory of items included in their SAE program;
- compile an accurate account of records of income and expenses for the SAE program;
- prepare a yearly financial summary of the SAE program; and

- record accurate information on all phases of student involvement in FFA and other youth activities.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Agribusiness career opportunities
  - Sales and service
  - Agricultural products and supplies
  - Natural resources
  - Horticulture
  - Equipment
  - Mechanics
  - Other related careers
- Student SAE program [Careers]
  - Considerations
    - Student needs
    - Local resources
- Human relations [Careers]
  - Personality and job success
  - Employer-employee relationships
  - Coworker relationships
  - Communication (verbal and written)
- Job application [Careers]
  - Looking for a job
  - Employer's view of application
  - Application blanks
  - Resume
  - Letter of application
  - Various application tests (e.g., knowledge of subject matter, motor skills)
  - Job interview
- Sales expertise [Careers, Mathematics]
  - Sales presentation
  - Sales slips
  - Charge accounts
  - Change making
- Student to develop plans and goals for an SAE program as it relates to student's career interest, example:
  - Horticulture
    - Orchard operations
    - Greenhouse operations
  - Sales and Service
    - Agricultural supply company
    - Seed or garden supplies

- SAE agreement [Careers]
  - Type of work
  - Number of hours and length of employment
  - Wages
  - Responsibilities of student, employer, school, and teacher
  - Signatures
- Recording techniques that relate to competencies gained by students in agribusiness-related SAE programs
  - Horticulture (for example)
    - Learning proper soil mixes
    - Learning to correctly water plants in a greenhouse
    - Learning to transplant
- Inventory [Mathematics]
  - Beginning inventory
  - Closing inventory
  - Value of items
  - Interest on investment
- Gifts and income other than SAE program [Mathematics]
- SAE program analysis [Mathematics]
  - Assets
  - Liabilities
  - Net income or loss
  - Interest on investment
  - Labor income
  - Cash wages
- Work-experience program [Mathematics]
  - Type of work
  - Hours worked
  - Wages
  - Deductions
  - Dates worked
- Summary of FFA activities [Careers, Social Studies]
  - Degrees earned
  - Awards won
  - Leadership activities
  - Speaking activities
  - Judging teams
  - Fairs and exhibits
  - Attendance at conferences and conventions

### *Motivational Activities*

- Take field trips to various agribusinesses, such as a credit associations, banks, and agricultural equipment dealers, to observe their bookkeeping systems.
- Encourage students to compete for awards in the FFA, Wisconsin Junior Dairyman's Association, and other organizations at the local, state, and national levels.
- Post bulletin board displays featuring recordkeeping.
- Invite resource speakers—such as local farmers; agribusiness people; and local, state, or national FFA officers or alumni—to give class presentations.
- View films, videotapes, and slides on topics related to this unit.
- Make available for student review the records of past award-winning students.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Develop and maintain a record book that suits your SAE program.
- Complete a simulated SAE program record book if a program is not possible.
- Complete a Proficiency Award application on a computer disk.

### *Instructional Materials*

#### **Textbooks and References**

*FFA Student Handbook* by Don Erickson and Martha Erickson. Alexandria, VA: National FFA Organization, 1985. Available from National FFA Supply Service.

*Record and Plan Book for Supervised Occupational Experience Programs*. Madison, WI: Wisconsin Association of Vocational Agricultural Instructors, n.d.

*Supervised Occupational Experience Handbook*. Alexandria, VA: National FFA Organization, n.d. Available from National FFA Supply Service.

#### **Bulletins and Pamphlets**

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Business Account Book*. 0423R. 1982.

*General Record Book*. 0438R. 1986.

*Improvement Project Record*. 0404R. 1981.

*Job Placement Record Book*. 0420R. 1986.

*Proficiency Record and Occupational Tasks: Agricultural Business, Supply, and Service*. 0426R.

*Vocational Agriculture Student Record*. 0440R. 1983.

#### **Periodicals**

*FFA New Horizons* (formerly *The National Future Farmer*)

## Computer Software

The following are available from Hobar Publications.

*FFA Leadership Record.* Apple.

*FFA and Vo-Ag Record Summary and Analysis.* Apple, IBM.

*SOEP Enterprise and Record Book.* Apple, IBM.

*SOEP Record and Record Summary Package.* Apple, IBM.

*SOEP Sample Program and Key.* Apple, IBM.

*Vo-Ag and FFA SOE Personal Financial Record.* Apple, IBM.

*Vo-Ag and FFA SOE Placement and Agribusiness Record.* Apple, IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Computers in AG Award Form.* FFA277.

*Computers in AG Award Info.* FFA276.

*Developing Proficiency Award Programs.* FFA163.

*Introduction to SOEP.* CLF611.

*SOE.* CLF600.

*SOE Directory.* CLF610.

The following is available from the National FFA Supply Service.

*Proficiency Software.* FDP-APL-2 (Apple), FDP-IBM-2 (IBM).

## Films, Videotapes, and Slides

The following are available from the National FFA Supply Service.

*SOE—Bridging the Gap.* SOEF-3 (16mm film, color, 13 minutes). Ciba-Geigy, n.d.

*SOE—Now More Than Ever.* SOEA-SS (80 slides with cassette, 12 minutes).

*Stars Over America.* SS-ACS-2 (140 slides with cassette, 15 minutes). Also available in 16mm film or VHS videotape from Venard Films.



## Supervised Agricultural Experience (SAE) Programs—Production Agriculture (5-12 days)

This unit deals with the Supervised Agricultural Experience (SAE) program relating to agricultural production. Topics include the value and usefulness of accurate records, using resource materials in choosing a career, career interests and goals, and arranging for Supervised Agricultural Experience programs.

### *Objectives*

- To increase student awareness of the value of Supervised Agricultural Experience programs as a means of acquiring and integrating knowledge about agriculture, careers, and education
- To give students opportunities to examine the role of SAE programs in learning and career development
- To provide students with an opportunity to articulate a tentative career interest in production agriculture and develop learning goals related to that interest
- To facilitate student inquiry into ways to make better use of resources available for career and educational planning
- To help students arrange and get formal approval for a supervised agricultural experience
- To develop student appreciation of the value of recordkeeping as a learning and management tool
- To provide students with instruction in how to set up and maintain useful and accurate records
- To help students identify skills and knowledge they acquired from their SAE program

### *Competencies*

At the conclusion of this unit, students will be able to

- explain the reasons behind the SAE program;
- recognize the range and nature of SAE programs available in production agriculture;
- identify a variety of improvement practices and skills relevant to their specific program area;
- explain and execute a production SAE program agreement;
- prepare an inventory, expense, and income record;
- explain the importance and uses of accurate and complete SAE program records;
- prepare a profit and loss statement and use the information in making management decisions;
- prepare a financial statement; and
- prepare an investment credit form and income tax return.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- SAE Programs—Production Agriculture [**Mathematics, Science, Social Studies**]
  - Define production programs
    - Programs related to farming
    - Ownership and management of capital, land, livestock, and other resources
    - Experience leading to farming occupations
  - Types of Production
    - Beef

- Crops
- Dairy
- Diversified livestock production
- Forest management
- Fruit and vegetable production
- Placement in agricultural production
- Poultry
- Sheep
- Swine
- Other
- Production agriculture SAE program terms
  - Productive enterprise
    1. beef cow-calf
    2. corn for grain
    3. farrow to finish swine
    4. laying hens
    5. dairy replacement
    6. apple production
  - Improvement practice
    1. reduced tillage
    2. weed control
    3. embryo transplants
    4. production record
    5. balanced rations
    6. spray program
  - Skills
    1. castrate
    2. calibrate sprayer
    3. clip needle teeth
    4. forward contracting
    5. dehorn
    6. pruning
- Production Agriculture SAE program records [**Mathematics, Social Studies**]
  - Purpose of records
    - Make management decisions
    - Establish credit
    - Determine total profit or loss
    - Determine individual enterprise profit or loss
    - Identify strengths and weaknesses of the enterprise
    - Income taxes
    - Apply for FFA awards
      1. proficiency
      2. Wisconsin FFA Degree
      3. American FFA Degree
    - Application for other awards and scholarships
  - Terms
    - Profit
    - Income

Expense  
Asset  
Liability  
Budget  
Financial statement  
Beginning and ending inventory  
Net income  
Agreement with parent or cooperator  
Efficiency and management records  
Feed and supply expense  
Program plan  
Labor record  
Products used at home  
Barter items (e.g., labor in exchange for feed)  
Investment credit

- Reasons for SAE programs
  - Leads to establishment in farming
  - Pride of ownership
  - Opportunity to learn by doing
  - Opportunity to earn money
  - Qualify for awards
  - Requirement for enrollment in Agriculture Education and FFA membership

### *Motivational Activities*

- Display or review exemplary projects of past and present students.
- Take a field trip to a livestock show or fair.
- Encourage students to compete for awards in local, state, and national competitions sponsored by agricultural organizations.
- Post bulletin board displays featuring topics related to this unit.
- Compile an FFA scrapbook.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program in production agriculture.
- Attend or take part in contests, fairs, and shows.
- Demonstrate activities and tasks related to production agriculture.
- Describe improvement practices related to production agriculture.
- Interpret records used in production agriculture.
- Describe the records used in the management of an enterprise in production agriculture.
- Identify the records needed to prepare income tax returns for a production agriculture operation.
- Demonstrate safety procedures to follow when working with agricultural equipment and livestock.
- Complete a Proficiency Award application on a computer disk.

## *Instructional Materials*

### **Textbooks and References**

- Agricultural Proficiency Awards Handbook*. Alexandria, VA: National FFA Organization, 1985. Available from the National FFA Supply Service.
- American Farmer Degree Handbook*. Alexandria, VA: National FFA Organization, 1978.
- Doane's Facts and Figures for Farmers*. St. Louis, MO: Doane Agricultural Service, 1977. Available from Interstate Printers and Publishers, Inc.
- FFA Advisor's Handbook*. Alexandria, VA: National FFA Organization, 1975. Available from the National FFA Supply Service.
- FFA Student Handbook* by Don Erickson and Martha Erickson. 8th ed. Alexandria, VA: National FFA Organization, 1985. Available from the National FFA Supply Service.
- Financial Planning in Agriculture* by Kenneth C. Schneeberger and Donald D. Osburn. Danville, IL: Interstate, 1977.
- A Guide to Curriculum Planning in Agriculture Education*. Madison, WI: Department of Public Instruction, 1980.
- Record and Plan Book for Supervised Occupational Experience Programs*. Madison, WI: Wisconsin Association Vocational Agricultural Instructors, n.d.
- Supervised Occupational Experience Handbook*. Alexandria, VA: National FFA Organization, n.d.
- Supervised Occupational Experience Manual* by Merle A. Carwin. 2nd ed. Danville, IL: Interstate, 1982. Available from National Farm Book Company.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Farm Records Example*. A7801211.
- Why Farmers Persist In or Drop Out of Young Farmer Instructional Programs*. R2459.

The following are available from Ohio Agricultural Education Curriculum Materials Service.

*Analysis Pages for Animal Enterprises* (1986) series includes the follow topics:

- "Analysis of Beef Breeding Enterprise." 0447R.
- "Analysis of Dairy Enterprise." 0446R.
- "Analysis of Marketing Livestock." 0449R.
- "Analysis of Sheep Breeding." 0448R.
- "Analysis of Swine Breeding Enterprise." 0445R.

*Analysis Pages for Plant Enterprises* (1986) series includes the following topics:

- "Analysis of General Farm Crops—Forages." 0443R.
- "Analysis of General Farm Crops—Fruits, Vegetables, and Root Crops." 0444R.
- "Analysis of General Farm Crops—Grain." 00442R.
- "Animal Enterprise Record Book." 0422R.
- "General Record Book." 0438R.
- "Plant Enterprise Record Book." 0421R.

*Proficiency Record of Occupational Tasks* series includes the following topics:

- "Agricultural Production." 0424R. 1986.
- "Agricultural Products Processing." 0428R.
- "Animal Production and Care." 0425R. 1988.
- "Vocational Agriculture Student Record." 0440R. 1983.

### **Periodicals**

*FFA New Horizons* (formerly *The National Future Farmer*)

### **Computer Software**

The following are available from Hobar Publications.

- FFA Leadership Record.* Apple.
- FFA and Vo-Ag Record Summary and Analysis.* Apple, IBM.
- SOEP Enterprise and Record Book.* Apple, IBM.
- SOEP Record and Record Summary Package.* Apple, IBM.
- SOEP Sample Program and Key.* Apple, IBM.
- Vo-Ag and FFA SOE Crops Record.* Apple, IBM.
- Vo-Ag and FFA SOE Livestock Record.* Apple, IBM.
- Vo-Ag and FFA SOE Personal Financial Record.* Apple, IBM.

The following is available from the National FFA Supply Center.

*Proficiency Software.* FDP-APL-2 (Apple), FDP-IBM-2 (IBM)

### **On-line Computer Networks**

The following are available from Ag Ed Network, AgriData Resources, Inc.

- Computers in AG Award Form.* FFA277.
- Computers in AG Award Info.* FFA276.
- Developing Proficiency Award Programs.* FFA163.
- Introduction to SOEP.* CLF611.
- SOE.* CLF600.
- SOE (Dir).* CLF610.

### **Laboratory Resources**

The following are available from Wisconsin State FFA Executive Secretary.

- American FFA Degree application form.
- Wisconsin FFA Degree application form.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*School Laboratory Record Book.* 0439R. 1986.

### Films, Videotapes, and Slides

The following are available from the National FFA Supply Service.

*A Proficiency Award For You.* (80 slides and cassette). National FFA Organization, 1975.

*SOE—Bridging the Gap.* SOEF-3 (16mm film, color, 13 minutes). Ciba-Geigy, n.d.

*SOE—Now More Than Ever.* SOEA-SS (80 slides with cassette, 12 minutes).

**Swine Science (10-20 days)**

This unit deals with factors involved in swine science. Topics include career opportunities, development of the swine industry, systems of swine production, breeding stock management, feeding and nutrition, swine facilities and their utilization, management for swine health, and marketing swine.

*Objectives*

- To acquaint students with employment information and career opportunities in the swine production industry
- To increase student understanding of systems and procedures used to manage swine herds
- To increase student awareness of swine breeding systems and selection
- To acquaint students with swine nutrition and feeding requirements
- To give students opportunities to examine the housing facility needs for swine herds
- To provide students with information on methods of marketing swine

*Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the swine industry—and relate it to their personal needs and aspirations;
- summarize the history of the swine industry;
- list current breeds of swine and their contribution to the industry;
- compare the management inputs of the different systems of swine production;
- select breeding stock based on type, performance records, and pedigrees;
- develop a breeding stock management plan;
- compare nutritional requirements of the stages of swine growth;
- discuss swine facilities and equipment needed for the different phases of swine production;
- identify the health and sanitation problems of raising swine;
- describe the market grades of swine;
- list and compare the methods of marketing swine for the different systems of production; and
- fit and show swine.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Development of the swine industry [Science]

- Early development to the present
- Breeds and their contribution to the industry
- Systems of swine production [Science]
  - Feeder pig production
  - Farrow to finish
  - Finishing of purchased feeder pigs
  - Breeding stock production
- Breeding stock management [Science]
  - Herd improvement through selection
  - Normal swine breeding habits
  - Breeding systems
  - Boar management
  - Artificial insemination
  - Management of sows and gilts
  - Farrowing house and nursery management
  - Enterprise records, registration, and pedigree performance
- Feeding and nutrition [Mathematics, Science]
  - Swine digestive system
  - Swine nutrient requirements
  - Swine feeding stuffs
  - Ration development
- Swine facilities and their utilization
  - Sows, boars, and herd replacement facilities
  - Farrowing facilities
  - Nursery
  - Finishing facilities
- Health management [Science]
  - Breeding herd
  - Farrowing to weaning
  - Vaccination
  - Parasite control
  - Common swine disease
  - Sanitation
  - Food and Drug Administration regulations
  - Specific Pathogen-Free (SPF) swine
- Marketing [Careers, Social Studies]
  - Market channels for hogs
  - Live feeder and market classes and grades
  - Live hog selection
  - Carcass grade and yield
  - Production and price movements
  - Marketing breeding stock



## *Motivational Activities*

- Take field trips to hog breeding facilities, market hog operations, and agribusinesses related to the swine industry.
- Post bulletin board displays featuring topics related to this unit.
- Make available to students computer programs designed to calculate costs and profits or losses of hog operations.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Take part in evaluating classes of breeding stock and market hogs.
- Be active in fitting and showing swine.
- Describe how to interpret performance data.
- Label and evaluate meat cuts.
- Report on caring for piglets, including giving shots, docking tails, clipping needle teeth, notching ears, and castrating.
- Design your idea of an ideal hog operation.
- Develop swine rations.
- Study swine diseases and report findings to the class.
- Prepare pork products for the class to sample.

## *Instructional Materials*

### **Textbooks and References**

- Animal Health—A Layman's Guide to Disease Control* by J.K. Baker and W.J. Greer. Danville, IL: Interstate, 1980.
- Animal Science* by E.M. Ensminger. 8th ed. Danville, IL: Interstate, 1983.
- Approved Practices in Swine Production* by J.K. Baker and E.M. Juergenson. 6th ed. Danville, IL: Interstate, 1988.
- Diseases of Swine* by Erwin Scholl. 6th ed. Ames, IA: Iowa State University Press, 1986.
- Feed Formulation Manual* by T.B. Keith and John P. Baker. 3rd ed. Danville, IL: Interstate, 1981.
- Feed Formulations* by Tilden Perry. 3rd ed. Danville, IL: Interstate, 1981.
- Feeds and Nutrition* by E.M. Ensminger and C.G. Olentine. Complete and abridged editions. Danville, IL: Interstate, 1978.
- Livestock and Poultry Production* by Clarence E. Bundy and Ronald V. Diggins. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1975.
- The Meat We Eat* by John R. Romans et al. 12th ed. Interstate, 1984.
- The Science of Animal Husbandry* by James Blakely and David Bade. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1985.
- Small-Scale Pig Raising* by Dirk Van Loon. Pownal, VT: Storey Communications, 1978. Available from National Farm Book Company.
- Swine Housing and Equipment Handbook*. 4th ed. Ames, IA: Midwest Plan Service, 1983.
- Swine Production* by Clarence E. Bundy and Ronald V. Diggins. Englewood Cliffs, NJ: Prentice Hall, 1976.
- Swine Science* by E.M. Ensminger and Richard Parker. 5th ed. Danville, IL: Interstate, 1984.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Artificial Insemination in Swine.* PIH64.

*Decking for Nursery Pigs.* PIH77.

*Energy Conservation in Ventilating and Heating Swine Buildings.* PIH92.

*The Environment in Swine Housing.* PIH54.

*Flooring for Swine.* PIH53.

*Methane Gas from Swine Manure.* PIH76.

*Pork Production Systems with Business Analyses, The High-Investment, High-Intensity, Confinement System.* PIH83.

*Remodeling Ideas for Farrowing Facilities.* PIH78.

*Solar Heating for Swine Buildings.* PIH90.

*Space Requirements for Swine.* PIH55.

*Swine Abnormalities.* A78863SW.

*Seine Coccidiosis.* PIH81.

*Swine Dysentery.* PIH56.

## Periodicals

*Hog Farm Management*

*Hogs Today* (formerly *Hogs Extra*)

## Computer Software

The following are available from ACS Software Publishing.

*Project Hog.* ACS218. Apple.

*Swine Management Game.* ACS213. Apple.

The following are available from Hobar Publications.

*Feeder Pig Costs.* Apple, IBM, TRS.

*Sow Program.* Apple, IBM, TRS.

*Swine Decision Aids.* IBM, Macintosh.

*Swine Herd Management.* Apple.

*Swine Production and Related Review.* Apple, IBM, TRS, Macintosh.

The following is available from Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Swine Production.* Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: Swine.* Apple.

*Agri-Quiz: Swine.* Apple, IBM.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Cash Feeder Pig Prices.* HS380.  
*Cost of Finishing Feeder Pigs.* HS188.  
*Feeding Swine.* CSU655.  
*Hog Marketing Decisions.* HS376.  
*Swine Breeds.* CSU652.  
*Swine Diseases.* CSU663.  
*Swine Herd Health Program.* HS705.

## Films, Videotapes, and Slides

The following are available from Agri-Farm Publications, Inc.

*Swine Gestation/Farrowing, Part 1.* 5699 (VHS videotape, 37 minutes).  
*Swine Housing and Equipment.* 5697 (VHS videotape, 38 minutes).

The following are available from Creative Educational Video, Inc.

*Fitting and Showing of Swine.* 210 (VHS videotape, 19 minutes).  
*Judging Breeding Swine.* 403 (VHS videotape, 30 minutes).  
*Judging Market Swine.* 402 (VHS videotape, 26 minutes).  
*Market Swine Grading.* 410 (VHS videotape, 32 minutes).  
*Pork and Lamb Cuts Grading.* 257 (VHS videotape, 26 minutes).  
*Pork Retail Cuts Identification.* 253 (VHS videotape, 27 minutes).

The following is available from the Grange Farm Film Foundation.

*Plus Pigs for Plus Profits.* (16mm film, color, 14 minutes.) 1979.

The following are available from Hobar Publications.

*Baby Pig Management.* 440 (26 color slides with cassette, 10 minutes).  
*Feeder Pig Production and Management—Farrowing Part II/Nursery/Choosing to Raise.* 15400750  
(VHS videotape, 36 minutes).  
*Feeder Pig Production and Management—Introduction.* 15400696 (VHS videotape, 24 minutes).  
*Swine Finishing Facilities.* H-75020 (VHS videotape, 45 minutes).

The following is available from Vocational Media Associates.

*Swine Production.* 30802-93 (Four filmstrips with cassette and reproducible masters).

## Equipment and Facilities

|                     |            |
|---------------------|------------|
| Side cutters        | Tagger     |
| Ear notcher         | Cookware   |
| Syringe and needles | Pig puller |

Iodine  
Castrating equipment  
Samples of swine medicine

Swine artificial insemination equipment  
Sample rations  
Computer

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## Tobacco (10-20 days)

This unit deals with the science of tobacco production. The topics include career opportunities, employment information, cultural practices, pest and weed control, harvesting, and the marketing of Wisconsin's tobacco crop.

### *Objectives*

- To acquaint students with employment information and career opportunities in the tobacco production industry
- To develop student understanding of the cultural practices necessary for a successful crop
- To increase student awareness of the labor, machinery, and building requirements of the tobacco crop
- To give students opportunities to explore marketing channels and procedures for tobacco crops
- To acquaint students with the uses of tobacco in both foreign and domestic channels

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunities for advancement, and other factors relative to potential employment in the tobacco industry—and relate it to their personal needs and aspirations;
- identify key soil and climatic variables affecting tobacco production in Wisconsin;
- describe equipment and building requirements for tobacco production;
- choose an appropriate tobacco variety for a given situation;
- describe procedures used to start tobacco plants in a bed;
- describe methods used to prepare a tobacco field for planting;
- outline recommended methods for transplanting tobacco plants from the bed to the field;
- develop a management plan to control disease, weeds, and insects in the tobacco field;
- identify and explain the steps involved in harvesting tobacco;
- understand tobacco markets, market price trends, and marketing procedures for tobacco;
- discuss the economics of tobacco production; and
- list state and federal laws and regulations concerning tobacco production.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Introduction [Mathematics, Science, Social Studies]
  - History
  - Efficiency factors
  - Climate and soil requirements
  - Labor, machinery, and building requirements
  - Cost efficiency
  - Fitting the tobacco enterprise into a farming program
  - Tobacco issues
    - Health concerns
    - Social concerns
- Choosing a variety of tobacco
  - Market factors
  - Soil and climate conditions
- Starting plants in a bed [Science]
  - Building the bed
  - Soil preparation
  - Chemicals for weeds and disease control
  - Seeding the bed
  - Watering, temperature control, and insect and disease control
  - Fertilizing
- Cultural practices [Science]
  - Tillage
  - Fertilizing and manuring
  - Maintaining correct pH
  - Transplanting
- Controlling insects, weeds, and disease [Science]
  - Biological control
  - Chemical control
  - Mechanical control
- Harvesting
  - Topping
  - Suckering
  - Cutting
  - Wilting
  - Piling
  - Spearing (stringing)
  - Hanging in the shed
  - Curing
  - Stripping
  - Storing on the farm
- Marketing [Science]
  - Market location
  - Market timing

- Tobacco uses
- Domestic and foreign markets
- Economics of tobacco [Mathematics, Social Studies]
  - Current market prices and price trends
  - Production costs
    - Labor
    - Machinery costs
    - Supplies
    - Manure
    - Land rent
    - Miscellaneous expenses
- Acreage allotment
  - Price support program
  - State and federal laws
  - Agricultural Stabilization and Conservation Service

### *Motivational Activities*

- Take field trips to tobacco-producing farms and tobacco warehouses
- Invite a tobacco marketing specialist to give a class presentation.
- Arrange for students to attend a tobacco exposition.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Research the marketing channels that tobacco goes through and give a report on it.
- Study grade, pricing, and marketing reports and describe your findings.

### *Instructional Materials*

#### **Textbooks and References**

- Approved Practices in Crop Production* by Elwood A. Brickbauer and William P. Mortenson. 2nd ed. Danville, IL: Interstate, 1978.
- Crop Production: Principles and Practices* by Stephen R. Chapman and Lark P. Carter. San Francisco: W.H. Freeman, 1976.
- Crop Production* by Richard J. Delorit and Louis Greub. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Plant Science* by Jules Janick et al. San Francisco: W.H. Freeman, 1981.

#### **Computer Software**

The following is available from Hobar Publications.

*Substitute Teacher—Volume V*. Apple.

### **Laboratory Resources**

Tobacco planter owner's manuals.

### **Films, Videotapes, and Slides**

The following is available from Modern Talking Picture Service, Inc.

*Leaf*. 12765 (16mm film, color, 14 minutes).

### **Equipment and Facilities**

Tobacco harvesting equipment

Tobacco planters

Tobacco seed



## Tractors and Engines (20-40 days)

This unit deals with understanding and safe operation of agricultural tractors and engines. Topics include career opportunities, gasoline and diesel engines, maintenance, operator's manuals, engine systems, hydraulics, and tractor and engine selection and application.

### Objectives

- To acquaint students with employment information and career opportunities in the agricultural power industry
- To increase student understanding of the basic principles of gasoline and diesel engines
- To develop student understanding of the systems found on engines
- To provide students with information on how to maintain and operate small and large gasoline engines and diesel engines
- To increase student ability to use operator's manuals to locate information and to follow step-by-step instructions for maintaining, diagnosing, and repairing
- To enhance student ability to use engines and tractors in a safe and efficient manner
- To create student awareness of criteria used to select appropriate engines and tractors for various applications

### Competencies

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the agricultural power industry—and relate it to their personal needs and aspirations;
- demonstrate an understanding of the basic principles of gasoline and diesel engines;
- maintain and operate small and large gasoline engines and diesel engines;
- use operator's manuals effectively to locate information;
- follow step-by-step instructions for maintenance, diagnosis, and repair operations;
- use engines and tractors in a safe and efficient manner;
- select appropriate engines and tractors for various applications;
- calculate fuel consumption needed for given acreages of various crops; and
- pass a safe tractor operator examination.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Engine operation [Science]
  - Internal combustion engine
  - Engine elements
  - Engine cycles (two- and four-stroke)
  - Engine systems
  - Engine types
  - Engine uses
- Basic engine components
  - Cylinder heads
  - Valves
  - Camshafts
  - Cylinder blocks
  - Cylinders
  - Pistons
  - Crankshafts
  - Balancers
  - Main bearings
  - Flywheel
  - Timing drives
- Fuel systems [Science]
  - Gasoline
  - LP gas
  - Diesel
- Engine systems
  - Intake and exhaust
  - Lubrication
  - Cooling systems
  - Governing systems
  - Electrical systems
- Electrical components [Science]
  - Storage batteries
  - Circuits
    - Charging
    - Starting
    - Ignition
    - Lighting and accessories
  - Maintenance
- Drives, transmissions, and components [Mathematics, Science]
  - Power train
  - Clutches
  - Mechanical transmissions
  - Hydraulic assist transmissions
  - Hydrostatic drives
  - Torque convertors

- Differentials
- Final drives
- Power takeoffs
- Special drives
- **Hydraulics [Science]**
  - Pumps
  - Valves
  - Cylinders
  - Motors
  - Accumulators
  - Filters
  - Seals
  - Fluids
  - Reservoirs and fluid transport components
- **Tests, tune-ups, and equipment [Science]**
  - Dynamometer test
  - Circuit testing and equipment
  - Troubleshooting
  - Nebraska Tractor Test analysis
  - Cleaning equipment and procedures
- **Tractor selection [Mathematics]**
  - Power requirements
  - Purchasing and operating costs
  - Nebraska Tractor Test results
  - Adaptability
- **Safe tractor operation**
  - Ignition procedures
  - Field operations
  - Adjustments
  - Gauge interpretations
  - Hitching and unhitching
  - Highway operation
  - Refueling
  - Engine "break-in"
  - Tractor operator's safety contests

### *Motivational Activities*

- Take field trips to agricultural implement dealers and equipment demonstrations.
- Post bulletin board displays featuring topics related to this topic.
- Organize tractor troubleshooting contests.
- Provide opportunities for hands-on engine work.
- Initiate a safe tractor operator program.
- View films, videotapes, and slides on related topics.

## *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Perform various service on tractors.
- Repair large or small farm tractors.
- Take part in an FFA Safe Tractor Operator's Contest.
- Be active in a safe tractor-driving program.

## *Instructional Materials*

### **Textbooks and References**

- Agricultural Power and Machinery* by C.O. Jacobs and W.R. Harrell. New York: McGraw-Hill, 1983.
- Diesel and High Compression Gas Engines* by Edgar J. Kates and W.E. Luck. Homewood, IL: American Technical Publishers, 1974.
- Farm Gas Engines and Tractors* by Fred R. Jones. 5th ed. New York: McGraw-Hill, 1980.
- Fundamentals of Machine Operation—Tractors*. 2nd ed. Moline, IL: John Deere Company, 1984.
- Gas Engine Manual* by Edwin P. Anderson. 3rd ed. New York: Macmillan, 1985.
- Light Utility Tractor Service Manual*. Overland Park, KS: Intertec Publishing, 1975.
- Machines for Power Farming* by Archie Stone and Harold E. Gulvin. 3rd ed. Ann Arbor, MI: Books on Demand, 1979.
- Modern Farm Power* by W.J. Promersberger et al. 3rd ed. Reston, VA: Reston Publishing, 1979.
- Small Tractor Service Manual*. 7th ed. Overland Park, KS: Intertec Publishing, 1988.

### **Bulletins and Pamphlets**

The following are available from the American Association for Vocational Instructional Materials.

- Hydraulics for Tractors and Other Mobile Equipment*. 121 (Vols. I and II). 1974.
- Safe Tractor Operation and Daily Care*. 103.
- Specifications for Tune-up and Service of Farm Tractors*. 101. 1982.
- Understanding and Measuring Power*. 902. 1978.

The following are available from the Cooperative Extension Service.

- Fatal Farm Accidents in Wisconsin*. A2302.
- Safe Use of Farm Tractors*. A8MNF623.

The following are available from Ohio Agricultural Education Curriculum Materials Service.

- Diesel Mechanics: Electrical Systems*. 759X.
- Diesel Mechanics: Fundamentals*. 757X.
- Hydraulics*. 765X.
- Power Trains*. 763X.
- Safe Operation of Agricultural Equipment*. 710X.

The following are available from Vocational Agriculture Services.

- Electrical Fundamentals Useful in Engine Analysis*. U3032.

*Engine Compression and Cylinder Leakage Testing.* U3025.  
*The Engine Cooling System.* U3030.  
*Farm Tractor Tune-Up.* U3008.  
*The Ignition System—Testing and Analyzing Test Results.* U3028.  
*Preventing Tractor Overturns.* U3040.

### **Periodicals**

*Implement and Tractor*  
*FFA New Horizons* (formerly *The National Future Farmer*)  
*Successful Farming*

### **Computer Software**

The following are available from Hobar Publications.

*Chains and Belts.* Apple.  
*Electrical Systems and Related Review.* Apple, IBM, TRS, Macintosh.  
*Engines and Related Review.* Apple, IBM.  
*Final Drives and Transmissions and Related Review.* Apple, IBM, TRS, Macintosh.  
*Hydraulics and Related Review.* Apple, IBM, TRS, Macintosh.  
*Tractor Preventive Maintenance Review.* Apple, IBM, TRS, Macintosh.  
*Tractor Selection Using Nebraska Tractor Test Data.* Apple.

The following is available from the Mid States Agri-Technology Associates, Ltd.

*Micro-Tutor: Tractors.* Apple, IBM.

### **On-line Computer Networks**

The following are available from Ag Ed Network, Agri Data Resources, Inc.

*Corn Belt Machinery Needs.* HS89.  
*Cost/Benefits: Storing Tractors.* HS76.  
*Cost/Benefits: Storing Trucks.* HS79.  
*Own or Lease a Tractor.* HS166.

### **Laboratory Resources**

The following is available from Hobar Publications.

*Safe Operation of Agricultural Equipment—Student Manual.* 10076. 1976.

The following is available from National Farm Book Company.

*Agriculture Power and Machinery (Workbook.)* 1983.

The following are available from the John Deere Company.

*Electrical Systems Workbook*. STSG-1004.

*Engines Workbook*. STSG-1002.

*Hydraulics Workbook*. STSG-1003.

*Power Trains Workbook*. STSG-1001.

#### **Films, Videotapes, and Slides**

The following is available from Ideal Pictures Film Library.

*Roar for Power*. (16mm film, color, 15 minutes.)

The following are available from the Bureau of Audio Visual Instruction.

*Engines and How They Work*. 04544 (16mm film, color, 11 minutes). Encyclopaedia Britannica Educational Corporation, 1982.

*Farm Tractor Safety*. 01044 (16mm film, color, 11 minutes). International Photographic Center, 1976.

*4-Cycle Engine*. 07523 (16mm film, color, nine minutes). Carousel, 1970.

*How to Time the 2-Cycle Engine*. 07525 (16mm film, color, eight minutes). Carousel, 1968.

*How to Troubleshoot a Small Engine (Power Mechanics Series)*. 07524 (16mm film, color, eight minutes). Carousel, 1970.

*Magneto Ignition*. 07526 (16mm film, color, six minutes). Carousel, 1970.

*Modern Engines and Energy Conversion*. 04837 (16mm film, color, 12 minutes). Centron, 1978.

*Rotary: Engine of the Future*. 08248 (16mm film, color, 12 minutes). Films Inc., 1973.

The following are available from the John Deere Company.

*Clean Air That Engines May Live*. SX-1073 (16mm film, color).

*Clean Fuel That Engines May Live*. SX-1076 (16mm film, color).

*Efficient Cooling Systems That Engines May Live*. SX-1074 (16mm film, color).

*Electrical Systems*. FOS-2005S (399 color slides). 5th ed. 1984.

*Engines*. FOS-2006S (300 color slides). 5th ed. 1986.

*Function of Lubrication That Engines May Live*. SX-1075 (16mm film, color).

*Hydraulics*. FOS1003S (209 color slides). 3rd ed. 1979.

*Power Trains*. FOS-4005S (167 color slides). 5th ed. 1984.

The following is available from the Ohio Agricultural Education Curriculum Materials Service.

*Tractor Safety Begins With You*. 711xx (VHS videotape, 20 minutes). Siegel and Associates, 1988.

The following is available from Teaching Aids, Inc.

*Introduction to Tractor Mechanics*. P-02-09426 (Two filmstrips with cassettes and guide). Vocational Media Associates, n.d.

*Tractor Operation and Safety*. B-264 (Four filmstrips with cassettes and guide). Bergwall Productions, n.d.

## **Turf Management (10-20 days)**

This unit deals with various aspects of turf management. Topics include career opportunities, seeding and grass species suitability, establishing lawns, cultural requirements, and maintenance care of lawns comprising weed, disease, and insect control measures.

### *Objectives*

- To acquaint students with employment information and career opportunities in the turf management industry
- To create student awareness of the nature and importance of the turf management industry
- To increase student understanding of the morphology of grass plants and seeds
- To enable students to distinguish between the various turf species and provide information on their application
- To develop student understanding of methods used to select and sow turf grass
- To provide students with information on soils, fertilization, and liming in relation to turf grass management
- To increase student comprehension of procedures used to establish and maintain lawns
- To familiarize students with the diagnosis and treatment of weed, insect, and disease problems in lawns

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the turf management industry—and relate it to their personal needs and aspirations;
- explain the difference between turf and lawn;
- identify the different turf grass species and list where they are planted;
- explain the factors that determine the suitability of a grass species such as soil condition, shading, and rainfall;
- identify the major parts of a grass seed and turf plant;
- explain information on grass seed package labels;
- give recommendations for turf grass mixes for different areas at correct seeding rates;
- explain complete and incomplete fertilizers and calculate the amount of nitrogen, phosphorus, and potassium for different fertilizers;
- list the sources of commercial lime and calculate how much would be required per 1,000 square feet to change the pH to the desired level;
- list the steps that should be taken when establishing a lawn by seed verses sod, and the cost of each method per 1,000 square feet;
- explain how to establish turf areas by vegetative means other than sod;
- determine the fertilization rate for different turf areas and grass species;
- explain the factors that will determine how much water an area will need and calculate the amount required;



- identify the major turf weeds noting life cycles, reproduction methods, and control measures that are common in the area;
- identify the major turf disease in the area and recommend control measures;
- identify the major turf insects in the area and recommend control measures; and
- demonstrate in the field the proper calibration and/or operation of turf maintenance equipment.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- Introduction to turf
  - Define turf
  - Define lawn
  - Development of the turf industry
  - Importance of turf grass management
- Parts of the grass plant [Science]
  - Roots
  - Stems
  - Stolons
  - Rhizomes
  - Leaves
  - Crown
  - Tiller
  - Ligule
  - Auricle
  - Sheath
  - Inflorescence
  - Node
- Turf grass species
  - Northern species
    - Kentucky bluegrass
    - Red fescue
    - Chewing fescue
    - Tall fescue
    - Colonial bent grass
    - Creeping bent grass
    - Annual ryegrass
    - Perennial ryegrass
    - Merion bluegrass
  - Southern species
    - Bermuda grass

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Zoysia  
Centipede grass  
Bahia grass  
Buffalo grass  
Carpet grass

- Factors that determine suitability of turf grass species [Science]
  - Light
  - Climate
  - Water
  - Temperature
- The grass seed
  - Seed coat
  - Endosperm
  - Embryo
- Grass seed labels
  - Species, variety, strain
  - Purity
  - Weed seeds
  - Noxious weed seeds
  - Inert matter
  - Crop
  - Germination
  - Seed treatment
- Turf grass mixtures
  - Lawns
    - Shady
    - Sun
  - Heavy-duty areas
  - Sloping areas
  - Temporary use
- Seeding rates [Mathematics]
  - Mix
  - Species
- Soils [Science]
  - Texture
  - Structure
  - Aeration
  - Organic matter
- Fertilizers [Science]
  - Forms of nitrogen
    - Synthetic inorganic

- Synthetic organic
- Natural organic
- Sources of phosphorus
  - Rock phosphate
  - Bone meal
- Sources of potassium
  - Potash
  - Potassium chloride
- Micronutrients
- Secondary nutrients
- Types of fertilizers
  - Complete
  - Incomplete
- Lime [Mathematics, Science]
  - Soil pH
  - Forms of lime
    - Gypsum
    - Dolomite
    - Calcite
  - Rate and application
- Steps in establishing a lawn by seeding
  - Rough grading
  - Drainage
  - Improving or adding soil
  - Seedbed cleaning
  - Liming and fertilizing
  - Final grade
  - Starter fertilizer
  - Seeding
  - Mulching
  - Watering
  - First mowing
- Steps in establishing a lawn by sodding
  - Rough grade
  - Drainage
  - Improving or adding soil
  - Seedbed cleaning
  - Liming and fertilization
  - Final grade
  - Sodding
  - Watering
  - First mowing

- Establishing lawns by other vegetative means

- Plugging
- Stolonization
- Sprigging

- Maintenance fertilization [Mathematics]

- Rates
  - Soil test
  - Turf species
  - Fertilizer companies' suggested rate
- Time of application
  - Spring
  - Summer
  - Fall
- Spreaders
  - Drop
  - Cyclone

- Watering lawns [Mathematics]

- Amount of water needed
  - Turf grass species
  - Climate
  - Time of year
  - Soil
- Irrigation systems
  - Permanent systems
  - Portable
- Time of watering

- Mowing

- Height of mowing
- Frequency of mowing
- Clippings
- Mowers
  - Rotary
  - Reel
  - Sickle bar
- Chemical mowing

- Renovation of lawns

- Dethatching
- Aerifying
- Overseeding
- Topdressing
- Vertical cutting
- Colorants

- Lawn weeds [Science]

- Definition of a weed

- Reproduction
  - Sexual
  - Asexual
- Life cycles
  - Annuals
  - Biennials
  - Perennials
- Common weed species
  - Barnyardgrass
  - Annual bluegrass
  - Crabgrass
  - Tall fescue
  - Foxtail
  - Quackgrass
  - Goosegrass
  - Bindweed
  - Chickweed
  - Blackseed plantain
  - Dandelion
  - Dock
  - Henbit
  - Purslane
  - Knot weed
  - Other
- Lawn weed control [Science]
  - Mechanical
  - Proper turf management
  - Herbicides
    - Contact
    - Systemic
    - Preemergent
    - Postemergent
  - Physical forms of fertilizers
    - Liquid
    - Granular
    - Wax bars
    - Powder (WP)
- Lawn diseases [Science]
  - Causing organisms
  - Infectious and noninfectious
  - Control
    - Good cultural practices
    - Fungicides
  - Types
    - Brown patch
    - Dollar spot
    - Blights

- Snow molds
  - Powdery mildew
  - Other
- Lawn Insects [Science]
  - Types
    - Leaf feeders
    - Root feeders
  - Control
    - Good cultural practices
    - Insecticides
  - Types
    - Grubs
    - Chinch bugs
    - Billbugs
    - Wireworms
    - Cutworms
    - Armyworms
    - Other

### *Motivational Activities*

- Take field trips to turf plots, athletic fields, golf courses, and sod farms.
- View films, videotapes, and slides on careers in turf management, turf areas, golf courses, and weeds and diseases affecting turf.
- Invite resource speakers, such as a grounds keeper or landscape architect, to give class presentations.
- Post bulletin board displays featuring topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Prepare a list of occupations in the turf management industry using an index of job titles.
- Participate in a mock job interview for a position in turf management.
- Dissect a grass plant and, using a stereoscope or hand lens, identify the major parts of the plant.
- Collect wedges of sod from several locations in a lawn and identify the different grass species.
- Determine the components on a grass seed label.
- Calibrate a spreader for different grass seed mixes.
- Calculate how much of a modifier, such as topsoil or lime, the soil needs to meet desired requirements.
- Compare brands of fertilizers and determine the weight of each element for each brand.
- Explain the advantages and disadvantages of different forms of fertilizer.
- Establish lawn areas around the school by using seeding and sodding methods.
- Calculate the cost of seeding and sodding an area.
- Establish lawn areas around the school by using seeding and sodding methods.
- Take part in a plugging, sprigging, and stolonization exercise.
- Calibrate a cyclone and drop spreader for different types of fertilizers.
- Set up a sprinkling system and calculate the amount of water it uses in an hour.
- Become familiar with the operation of several pieces of lawn establishment and maintenance equipment.

- Collect, identify, and display various lawn insects.
- Set up demonstration plots to compare different types of herbicides.
- Develop recommendations for improving poor turf areas.

### *Instructional Materials*

#### **Textbooks and References**

- All About Lawns* by Michael MacCaskey. rev. ed. San Francisco: Ortho Books, 1985.  
*Common Weeds of the United States*. New York: Dover Publications, 1971.  
*Lawn, Garden, and Power Equipment, Owner's Manual*. Overland Park, KS: Intertec Publishing. n.d.  
*Lawns* by Jonas Vengris. 3rd ed. Fresno, CA: Thomson Publications, 1982.  
*Lawns and Ground Covers* by Michael MacCaskey. Tucson, AZ: HP Books, n.d.  
*Lawns and Ground Covers*. Menlo Park, CA: Sunset Books/Lane Publishing, 1979.  
*Turf Management Handbook* by Howard B. Sprague. 3rd ed. Danville, IL: Interstate, 1982.  
*Turfgrass Management* by Al. Turgeon. rev. ed. Reston, VA: Reston Publishing, 1980.  
*Turfgrass Science and Management* by Robert D. Emmons. Albany, NY: Delmar, 1984.  
*Weeds of the U.S. and Their Control* by Harri J. Lorenzi. New York: AVI Publishing, 1987.

#### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

- Care and Sharpening of Lawn and Garden Tools*. A2683.  
*Lawn Fertilization*. A2303.  
*Lawn Insects: How to Control Them*. AG53.  
*Powdery Mildew of Ornamentals*. A2404.  
*Turf Insect Pest Control Guide*. A2934.

#### **Periodicals**

- American Lawn Applicator*  
*Southern Golf—Landscape & Resort Management* (formerly *Landscape and Turf*)

#### **Computer Software**

The following is available from Midwest Agribusiness Services, Inc.

- Agri-Quiz: Turf and Ground Covers*. Apple, IBM.

The following is available from Photocom.

- Turf and Ground Covers*. Apple, IBM.

## Laboratory Resources

The following are available from Pace Productions, Inc.

*Sharpening a Rotary Mower Blade*  
*Sharpening and Adjusting Grass Shears*

The following is available from the Pennsylvania Instructional Materials Service.

*Turfgrass Maintenance and Establishment.* 1968.

## Films, Videotapes, and Slides

The following are available from the Pennsylvania Instructional Materials Service.

*Exploring Turfgrass Occupations.* (30 color slides).  
*Weed Identification.* (37 color slides).

The following are available from Photocom.

*Complete Turf Management Series.* 41-110 (Three color filmstrips with three cassettes).  
*How to Control Pests and Diseases in the Landscape—Turfgrass.* 52-200-3 (Videotape).  
*Lawns: Planting and Care.* 40-202 (Videotape).

The following are available from Vocational Agriculture Services.

*Lawn Weeds—Identification and Control.* F650 (39-frame filmstrip with study guide).  
*Seed Structure and Identification of Cool Season Turfgrasses.* S653 (61 slides with study guide).  
*Steps to a Better Lawn.* F651a (85-frame filmstrip with study guide).

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*How to Care for Your Lawn.* 247X (VHS videotape, color, 53 minutes).  
*Lawn Renovation and Reestablishment.* 2058S (61 color slides and script). rev. 1988.  
*Turf Disease of the Midwest.* 2034S (76 color slides with script). 1986.

The following is available from Vocational Education Productions.

*Lawn and Ground Covers.* 1-204-1314 (Filmstrip with cassette and script).

The following is available from Vocational Media Associates.

*Turfgrass Management.* 30796-93 (Filmstrip with program guide).

## Vegetable Crop Science (30-45 days)

This unit deals with the aspects of vegetable production in Wisconsin. Topics include employment and career opportunities, soils and soil conservation, plant structure and processes, plant propagation, land preparation, planting, cultivation, irrigation, weed identification and control measures, insect control, disease control, harvesting, storage, marketing, and shipping.

### *Objectives*

- To acquaint student with employment information and career opportunities in the vegetable crop industry
- To increase student understanding of the scope and importance of the vegetable industry
- To enhance student comprehension of the relationship of various soil factors and soil management practices to vegetable production
- To develop student understanding of basic plant morphology and plant processes
- To provide students with information on approved practices for planting, cultivating, and irrigating vegetable crops
- To familiarize students with the control and treatment of weed, insect, and disease problems in vegetable crops
- To give students opportunities to examine the methods used to harvest and store vegetable crops
- To develop student understanding of procedures for marketing and shipping vegetable crops

### *Competencies*

At the conclusion of this unit, the students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the vegetable crop industry—and relate it to their personal needs and aspirations;
- locate fresh and processed vegetable crop production areas in the United States and Wisconsin;
- explain the economic importance of the canning industry and the fresh market industry in Wisconsin;
- describe the physiochemical requirements of the most desirable soil for major vegetable crops;
- discuss the typical kinds of soil erosion and control;
- differentiate the types of soil moisture and loss;
- describe the three essential phases of plant growth and development;
- distinguish between monocotyledonous and dicotyledonous vegetable crop seeds;
- identify the types and parts of the flower;
- develop a written plan for seedbed preparation, planting, and cultivation of selected vegetable crops;
- classify common vegetable crop insects;
- list common diseases and the methods for their control;
- describe the factors that determine the time and method of harvest;
- discuss the storage methods for fresh market vegetables;
- identify the major factors related to transportation of fresh market vegetables; and
- be familiar with the locations of vegetable processing plants and markets.



**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- **Careers**
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- **Occupations [Social Studies]**
  - Production
  - Harvesting
  - Processing
  - Marketing
  - Engineering
- **Scope and economic importance [Social Studies]**
  - Foreign
  - National
  - State
  - Local area
  - Vegetable crop statistics
- **Soil selection [Science]**
  - Physical requirements
  - Chemical requirements
  - Specific crop requirements
- **Soil and moisture conservation [Science]**
  - Erosion
    - Water
    - Wind
  - Factors influencing soil erosion
    - Soil structure and texture
    - Climate
    - Vegetative cover
    - Slope
    - Land use
  - Erosion control methods
    - Management practices
      - 1. land usage
      - 2. water disposal systems
      - 3. cover crop
      - 4. fertilizer and lime use
      - 5. gully control
    - Mechanical practices
      - 1. terracing
      - 2. strip cropping
      - 3. crop rotation

- 4. water outlets
  - 5. diversion
  - 6. row direction
- Soil water losses
  - Soil water types
    - 1. capillary
    - 2. hygroscopic
    - 3. gravitational
  - Soil water estimation
  - Soil water loss methods
    - 1. surface run-off
    - 2. evaporation
    - 3. transpiration
    - 4. percolation
- Soil sampling and testing
  - Proper timing
  - Proper procedure
  - Soil test results
  - pH testing
  - NPK testing
  - Organic matter content
  - Minor elements
- Fertilization
  - Analysis formula and ratios
  - Nutrient requirements
  - Application of fertilizer
    - 1. purposes
    - 2. common types
      - commercial
      - animal manure
      - green manures and crop residue
    - 3. time of application
    - 4. methods
      - broadcast
      - drilled
      - foliar
      - knifed
    - 5. macronutrients
    - 6. micronutrients
- Plant structure [Science]
  - Plant cells
  - Roots
  - Stems
  - Leaves
- Seed germination [Science]
  - Seed functions
  - Dicotyledonous and monocotyledonous seeds

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- Germination conditions
  - Moisture
  - Temperature
  - Oxygen
  - Seed storage
  - Seed treatment
  - Seed dormancy
- Plant processes [Science]
  - Photosynthesis
  - Absorption
    - Diffusion
    - Osmosis
  - Distribution
  - Respiration
  - Transpiration
  - Plant food usage
  - Plant food storage
    - Annuals
    - Biennials
    - Perennials
- Plant propagation and improvement [Science]
  - Sexual reproduction
    - Floral parts and functions
    - Types of flowers
    - Pollination
  - Fertilization
  - Asexual reproduction
    - Specific crops
    - Economics of reproduction
  - Genetic improvement
    - Cells, chromosomes, and genes
    - Segregation and recombination
    - Variations
    - Cultivar improvement methods
- Land preparation [Science]
  - Tillage
  - Crop residue disposal
  - Seed characteristics
    - Specific crops
    - Economic factors
  - Seedbed preparation implements
- Planting
  - Seed selection
    - Seed examination
    - Seed characteristics
    - Seed germination tests

- Equipment and methods
  - Planting equipment
  - Planting methods
  - Planting and harvesting dates (indoor and outdoor)
    1. market price and availability
    2. climate
- Cultivation [Science]
  - Methods
  - Efficiency factors
  - Equipment
  - Labor requirements
- Irrigation [Science, Social Studies]
  - History
  - Methods of irrigation
    - Sprinkler types
    - Surface
    - Trickle
    - Subsurface
  - Water sources
    - Cost
    - Accessibility
    - Government and industry regulations
  - Peak demands
  - Economics of irrigation
    - Crop production costs
    - Market price
    - Volume requirements
    - Crop quality
- Weed identification [Science]
  - Annual
  - Biennial
  - Perennial
- Weed control methods [Science]
  - Mechanical
    - Equipment types
    - Application factors
  - Chemical
    - Safety
    - Chemical laws and regulations
    - Application rates
    - Application factors
    - Sprayer calibration
- Insect control methods [Science]
  - Chemical

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- Insect identification
- Insecticides
- Government application rules and regulations
- Application factors
- Sprayer calibration
- Biological
  - Effectiveness
  - Economic factors
- Disease control methods [Science]
  - Disease identification
  - Seed treatments
  - Fungicides
  - Antibiotics
  - Chemical safety
  - Sprayer calibration
  - Crop rotation factors
- Vegetable crop harvest
  - Methods
    - Crop uses
      1. fresh market
      2. processing
    - Storage or shipping requirements
    - Land characteristics
    - Labor supply
    - Crop perishability
    - Harvest time
- Vegetable crop storage
  - Perishability
  - Market location
  - Transportation requirements
  - Market price
  - Cost factors
- Marketing [Social Studies]
  - Market demands
  - Distance from production area
  - Transportation requirements
  - Marketing strategy
  - Storage requirements
- Shipping
  - Marketing distance
  - Equipment
  - Custom or private

### *Motivational Activities*

- Take a field trip to
  - a local canning factory,
  - a wholesale produce warehouse,
  - an urban fresh vegetable market,
  - a commercial greenhouse that grows vegetable or plants for truck gardeners, and
  - experimental or demonstration plots at a nearby college or experimental station.
- Visit farms that grow vegetables for food-processing plants and ones that grow vegetables for the fresh market during planting and harvesting.
- Post bulletin board displays featuring topics related to this unit.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Identify different vegetables and varieties.
- Grow vegetables in demonstration plots, greenhouses, or plant stands to show nutrient deficiencies.
- Experiment with germinating seeds and identify the conditions that they need to grow.
- Test soils for acidity and nutrient content.
- Design a specific five-year vegetable crop rotation plan for a farm.
- Identify insects common to vegetables grown in the area.
- Identify various weeds common to the production area.
- Develop a written plan for the commercial production of a vegetable common in your area. This plan should include the type of soil required, plant growth and development, cultural development, pest control, types of harvesting and shipping, and a thorough outline of the different types of marketing involved with the production of that crop.

### *Instructional Materials*

#### *Textbooks and References*

- All About Vegetables* by Ken Burke and Walter Dotty. rev. ed. San Francisco: Ortho Books, 1981.
- How to Grow Vegetables and Berries*. Menlo Park, CA: Sunset Books/Lane Publishing, 1982. Available from National Farm Book Company.
- How to Know the Insects* by Roger G. Bland and H. E. Jaques. Dubuque, IA: William C. Brown, 1978.
- Keeping the Harvest. Home Storage of Vegetables and Fruits* by Gretchen Mead. rev. ed. Charlotte, VT: Garden Way Publishing, 1983. Available from National Farm Book Company.
- Knott's Handbook for Vegetable Growers* by Oscar A. Lorenz and Donald N. Maynard. 2nd ed. New York: John Wiley and Sons, 1980.
- Modern Marketing of Farm Products* by W. P. Mortenson. 3rd ed. Danville, IL: Interstate, 1977.
- Our Soils and Their Management* by Roy L. Donahue. 5th ed. Danville, IL: Interstate, 1983.
- Producing Vegetable Crops* by George W. Ware and J. P. McCollum. Danville, IL: Interstate, 1980. Available from National Farm Book Company.
- Westcott's Plant Disease Handbook* by Cynthia Westcott. New York: Van Nostrand Reinhold, 1971.

## Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

*Annual Broadleaf Weed Identification*. NCR90.  
*Disease Resistant Vegetables for the Home Garden*. A3110.  
*General Plant Disorder: Slugs*. A3186.  
*Glossary of Insecticides for Vegetable Crops*. A2301.  
*Growing Vegetables at Home—Questions and Answers*. A2801.  
*Harvesting Vegetables from the Home Garden*. A2727.  
*Managing Insects in the Home Vegetable Garden*. A2088.  
*Organic Soil Conditioners*. A2305.  
*Sweetcorn Pest Management in Wisconsin—1988*. A2345.  
*Storage Requirements of Produce*. A3108.  
*The Vegetable Garden*. A1989.  
*Vegetable Insects*. A2093.

The following is available from the Meister Publishing Company.

*1979 Weed Control Manual and Herbicide Guide*

## Periodicals

*American Vegetable Grower*  
*Minnesota Horticulturist*  
*Packer*  
*Rodale's Organic Gardening*

## Computer Software

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Plant*. Apple II  
*Agri-Quiz: Soils*. Apple, IBM

The following is available from Hobar Publications.

*Soil Evaluation, Fertility and Related Review*. Apple, IBM, TRS, Macintosh.

## On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Vegetable Analysis and Outlook*. HS537.  
*Vegetable Cooperative Membership*. HS114.  
*Vegetable Farm Machinery Needs*. HS94.  
*Vegetable Transportation Facts*. HS531.

## Films, Videotapes, and Slides

The following are available from the Bureau of Audio Visual Instruction.

*Food and Jobs: Wisconsin Agriculture.* 11370 (VHS videotape, color, 25 minutes) or 11627 (16mm film, color, 25 minutes). University of Wisconsin, Department of Agricultural Journalism, 1987.  
*The Insect Alternative.* (Nova Film Series.) 02490 (16mm film, color, 57 minutes). Time Life, 1978.  
*Integrated Pest Management.* 10125 (16mm film, color, 22 minutes) or 11350 (VHS videotape, color, 22 minutes). University of Wisconsin, Department of Agricultural Journalism, 1984.  
*Vegetables For All Seasons.* 09392 (16mm film, color, ten minutes). Barr Films, 1972.  
*Wisconsin's Central Sands.* 00451 (16mm film, color, 27 minutes). University of Wisconsin, Department of Agricultural Journalism, 1976.

The following are available from Teaching Aids, Inc.

*Safe Handling of Pesticides.* R75023 (VHS videotape, color, seven minutes).  
*Vegetable Gardening.* R-VT1026 (VHS videotape, color, 55 minutes).

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## Waste Management (5-10 days)

This unit deals with the technologies associated with animal waste management. Topics include characteristics of animal waste; the collection, storage, handling, and reutilization of animal waste, and the various designs and operation of waste management systems.

### *Objectives*

- To acquaint students with employment information and career opportunities in the waste management industry
- To help students relate waste management practices to the ecology of the surrounding environment
- To familiarize students with waste management terms
- To present students with guidelines for the location, design, and construction of waste collection, storage, and treatment systems
- To create student awareness of how governmental agencies regulate waste management practices
- To acquaint students with various waste management systems
- To increase student understanding of how various waste management systems work
- To emphasize to students the need to manage and use wastes effectively and responsibly

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the waste management industry—and relate it to their personal needs and aspirations;
- define waste management terms and definitions
- describe the factors to be considered in location, design, and construction of waste collection, storage, and treatment systems;
- list local, state, and federal regulations on waste handling;
- comprehend how waste management systems work;
- differentiate between waste management systems and their components;
- emphasize the importance and means of waste utilization; and
- develop an awareness in the relationship of manure management as it relates to the ecology of the surrounding environment.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

- Careers
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors

- Introduction [Careers, Social Studies]
  - Waste disposal overview
  - Local, state, and federal regulations
  - Systems
    - System principles
    - How to decide on a system
- Characteristics of animal waste [Mathematics, Science]
  - Manure
  - Bedding
  - Milkhouse and parlor wastes
  - Runoff from feedlots
  - Gases and odors from stored wastes
- Collecting livestock wastes [Mathematics, Science]
  - Within facilities
    - Slotted floors
    - Grated floors
    - Sloping floors
    - Scrapers and blades
    - Front-end loaders
    - Flushing gutters
  - Feedlot and yard runoff
    - Roof gutters
    - Downspouts
    - Concrete channels
    - Earthen channels
- Storage of livestock wastes [Science]
  - Storage gutters
  - Below-ground storage tanks
  - "Silo" storages
  - Earthen storage
    - Solid manure
- Liquid and slurry
  - Holding ponds
  - Solid manure storage
- Liquid-solid separation [Science]
  - Settling system
  - Screening and dehydration
- Biological treatment [Science]
  - Anaerobic lagoons
  - Aerobic lagoons
    - Naturally aerated
    - Mechanically aerated

- Composting
- Anaerobic digestors
- Waste transporting [Science]
  - Type of manure
    - Solid
    - Slurry
    - Liquid
  - Means of transporting
    - Pumps
    - Augers
    - Tank wagons
    - Piping
    - Irrigation
- Utilization and disposal of animal waste [Mathematics, Science]
  - Land application
    - Fertilizer value
  - Refeeding
    - Nutritional value
  - Energy
    - Gas value
- Safety aspects
  - Ventilation of gases
  - Mechanical operation

### *Motivational Activities*

- Take field trips to
  - the local municipal sewerage plant,
  - animal waste storage and treatment systems, and
  - manufacturers of waste management system components.
- Post bulletin board displays and create charts featuring topics related to this unit.
- View films, videotapes, and slides on related topics.
- Make available to students computer software designed to provide instruction about animal waste management.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program related to the waste management industry.
- Develop a waste management system for a farm.
- Collect and evaluate advertising materials related to animal waste management.

## *Instructional Materials*

### **Text and Reference Books**

- Agricultural Structures*. 2 vols. Columbia, MO: Missouri Instructional Materials Laboratory, 1981.  
Available from Ohio Agricultural Education Curriculum Materials Service.  
*Earth Ponds: The Country Pond Maker's Guide* by Tim Matson. Woodstock, VT: Countryman Press, 1982. Available from National Farm Book Company.  
*Livestock Waste Facilities Handbook*. 2nd ed. Ames, IA: Midwest Plan Service, 1985.

### **Bulletins and Pamphlets**

The following are available from Cooperative Extension Service.

- Controlling Odors from Swine Buildings*. PIH33.  
*Fertilizer Value of Swine Manure*. PIH25.  
*Flushing Systems for Swine Buildings*. PIH63.  
*Gravity Drain Gutters for Swine Manure Systems*. PIH95.  
*Lagoon Systems for Swine Waste Treatment*. PIH62.  
*Legal Guidelines for Swine Waste Management*. PIH35.  
*Livestock Yard Runoff Control Systems*. A3077.  
*Methane Gas from Swine Manure*. PIH76.  
*Pumping Liquid Manure from Swine Lagoons and Holding Ponds*. PIH91.  
*Solid Manure Handling for Livestock Housing, Feeding and Yard Facilities in Wisconsin*. A2418.  
*Swine Waste Management Alternatives*. PIH67.  
*Systems of Runoff Control*. PIH21.  
*Waste Management in Swine Finishing Units*. A3104.

### **Periodicals**

- Dairy Herd Management*  
*Hoard's Dairyman*  
*Hog Farm Management*  
*Successful Farming*

### **Computer Software**

The following is available from Agri-Education, Inc.

- Manure Management*. Apple, IBM

### **On-line Computer Networks**

The following are available from Ag Ed Network, Agri Data Resources, Inc.

- Dairy Housing Costs*. HS81.  
*Dairy Housing Systems*. HS80.  
*Dairy Waste Management Alternatives*. HS87.

### **Films, Videotapes, and Slides**

The following are available from Teaching Aids, Inc.

*Facilities, Nutrition, Health, and Management of a Feeder-to-Finish Swine Enterprise.* CD15400758  
(VHS videotape, color, 36 minutes).

*Waste Management, Buildings and Equipment.* CD15400682 (VHS videotape, color, 36 minutes).

## Weed Identification and Control (10-20 days)

This unit deals with the identification and control of weeds and weed seeds. Topics include career opportunities, weed types, classifications, characteristics, and control methods.

### *Objectives*

- To acquaint students with employment information and career opportunities in the weed control industry
- To increase student awareness of the economic impact weeds have on agricultural production
- To draw students' attention to the effect weeds have on environmental aesthetics
- To characterize the weed control problems Wisconsin agriculturalists encounter
- To provide students with opportunities to classify and describe weeds using the appropriate terminology
- To inform students of preventative and remedial methods for weed control
- To enhance student ability to make sound decisions concerning the choice of methods for weed control
- To provide students with instruction in the effective, legal, safe, and responsible use of herbicides

### *Competencies*

At the conclusion of this unit, students will be able to

- explain current employment information—such as job descriptions, job availability, personal and educational requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the weed control industry—and relate it to their personal needs and aspirations;
- develop a list of detrimental effects weeds have on crop production;
- describe the aesthetic effects of weeds;
- identify weeds common to Wisconsin;
- identify weed seeds common to Wisconsin;
- define terms used in the classification of weeds;
- list examples of weeds in the various weed classification categories;
- apply specific preventative practices of weed control, such as using clean seed and exercising caution with custom operators;
- interpret and apply chemical recommendations for specific weed problems;
- recognize when to use mechanical weed control methods;
- define terms relating to time of herbicide application;
- define terms relating to the type of application;
- apply a formula used in calibrating a sprayer;
- list the proper steps of safe handling of herbicides;
- interpret the ingredients found on a chemical label;
- interpret and apply noxious weed laws to a local situation; and
- perceive possible effects of herbicides on the environment.

**Subject Matter** (Basic skills integration areas are shown in brackets following title.)

- **Careers**
  - Current and future employment needs
  - Job descriptions
  - Training requirements
  - Working conditions
  - Opportunities for advancement
  - Other factors
- **Economics of weed control [Social Studies]**
  - Effect of food supply
  - Increased production costs
  - Aesthetic values
  - Hazard to livestock and people
- **Weed identification [Science]**
  - Plant identification
  - Seed identification
- **Weed types [Science]**
  - Grasses
  - Sedges and rushes
  - Broadleaf
  - Aquatics
  - Trees and brush
  - Parasitic plants
- **Classifications of weeds [Science]**
  - Annuals, biennials, perennials
  - Root systems
  - Noxious weeds and special laws
  - Taxinomical families
- **Cultural characteristics of weeds [Science]**
  - Response to soil condition
  - Growth habits
  - Tolerance
  - Response to weather conditions
  - Response to chemicals
  - Life cycles
- **Weed control methods [Mathematics, Science]**
  - Preventative practices
    - Rotation
    - Seedbed
    - Prevention from seeding (mowing, etc.)
    - Planting times
    - Cover crops

- Nurse cropping
- Strip cropping
- Certified seed
- Chemical
  - Types
  - Time and type of application
    - 1. foliar
      - contact nonselective
      - contact selective
      - systemic nonselective
      - systemic selective
    - 2. soil
      - temporary residue nonselective
      - temporary residue selective
      - permanent residue nonselective
      - permanent residue selective
  - Equipment
  - Calibration of equipment
- Mechanical cultivation
- Other
  - Flame
  - Mulch
  - Smothering

- Environmental effects of herbicides [Science]

### *Motivational Activities*

- Take field trips to collect and identify weeds and weed seeds and to observe weed herbicide trials.
- Demonstrate how to calibrate a sprayer.
- Invite resource people to give class presentations.
- Post bulletin board displays featuring topics related to this unit.
- Develop a test plot of crops commonly grown in the area and apply different levels of herbicides to them. Monitor the results and report on them.
- View films, videotapes, and slides on unit-related topics.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program related to the weed control industry.
- Collect, label, and display weed seeds common to the area.
- Calibrate a sprayer.
- Collect and display labels from herbicide containers.
- Develop test plots to study the effects of herbicides.

### *Instructional Materials*

#### Textbooks and References

*Crop Chemicals* by Harold A. Hughes. 2nd ed. Moline, IL: John Deere Company, 1982.



- Crop Production* by Richard J. Delorit and Louis Greub. 5th ed. Englewood Cliffs, NJ: Prentice Hall, 1984. Available from National Farm Book Company.
- Farmers Weed Control Handbook* by Robert D. King. Bloomington, MN: Doane Information Services, 1985. Available from Interstate Printers and Publishers, Inc.
- A Field Guide to Wildflowers of Northeastern and Northcentral America* by Roger Tory and Margaret McRenny. Boston, MA: Houghton Mifflin, 1968.
- Illustrated Taxonomy Manual of Weed Seeds* by Richard J. Delorit. River Falls, WI: Agronomy Publications, 1970. Available from National Farm Book Company.
- Vegetative Identification of Common Row Crop Weeds* by Allan Beuerman and Ellery Knake. Urbana, IL: Vocational Agriculture Service, University of Illinois, n.d. Available from Interstate Printers and Publishers, Inc.
- Weed Science: Principles and Practices* by Glenn C. Klingman and Floyd M. Ashton. 2nd ed. New York: John Wiley and Sons, 1982. Available from National Farm Book Company.
- Weeds of the United States and Their Control* by Harri J. Lorenzi and Larry S. Jeffrey. New York: AVI Publishing, 1987. Available from Nasco.
- Wildflowers and Weeds, A Guide in Full Color* by Booth Courtenay and James H. Zimmerman. New York: Van Nostrand Reinhold, 1978.

#### Bulletins and Pamphlets

The following are available from the Cooperative Extension Service.

- Annual Broadleaf Weed Identification*. NCR90.
- Annual Broadleaf Weed Seedling Identification*. NCR89.
- Annual Grass and Perennial Weed Identification*. NCR92.
- Annual Grass and Perennial Weed Seedling Identification*. NCR91.
- Controlling Canada Thistle*. NCR218.
- Field Crop Herbicide Manual for Dealers and Custom Applicators*. A2296. 1987.
- Nightshade Control in Field Crops*. NCR164.
- Quackgrass Control in Field Crops*. NCR219.
- Yellow Nutsedge Control in Field Crops*. NCR220.
- Weeds of the North Central States*. A9NXP281.

#### Periodicals

- Soil and Water Conservation News*
- Soil Science Society of America Journal*

#### Computer Software

The following are available from Agri-Education, Inc.

- Herbicide Selection*. Apple, IBM.
- Weed Control*. Apple, IBM.

The following is available from Midwest Agribusiness Services, Inc.

- Agri-Quiz: Pests and Pest Control*. Apple, IBM.

### On-line Computer Networks

The following are available from Ag Ed Network, AgriData Resources, Inc.

*Alfalfa Weeds.* CSU336.

*Pesticide Movement and Use.* HS699.

*Safe Use of Pesticides.* HS698.

### Laboratory Resources

The following are available from the University of Wisconsin-Platteville, Department of Horticulture.

Weed plant specimens

Weed seed plaques

### Films, Videotapes, and Slides

The following are available from the Environmental Protection Agency.

*How Pesticide Users Think and Act.* (VHS videotape, 55 minutes.) 1975.

*Patterns of Herbicide Use.* (VHS videotape, 38 minutes.) 1975.

The following are available from Hobar Publications.

*Broadleaf Weeds.* D23 (230 slides).

*Narrowleaf Weeds.* D24 (105 slides).

*Weed Seedlings and Spring Regrowth* 453 (Part one: 48 slides with cassette) and 454 (Part two: 53 slides with cassette).

*Weeds and Weed Seed Identification.* D2 (89 slides with cassette, 28 minutes).

The following is available from Nasco.

*How Herbicides Work.* C11931 (46 transparencies).

The following are available from the Ohio Agricultural Education Curriculum Materials Service.

*Identification of Weed Plants.* 1040S (80 slides with script) or 1041N (Script only). 1988.

*Identification of Weed Seeds.* 1038S (35 slides with script) or 1039N (Script only). 1988.

*Weed Plants.* (40 color photographs with descriptions.)

## Wisconsin Junior Dairyman's Association (WJDA) (5-15 days)

This unit deals with the Wisconsin Junior Dairyman's Association (WJDA). Topics include WJDA aims and purposes, its constitution, structure, contests, and history; and the application of knowledge and skills acquired on a dairy farm or related agribusiness.

### Objectives

- To develop student appreciation of the history and purposes of the WJDA organization
- To increase the student understanding of the organization and structure of the WJDA
- To acquaint students with WJDA contests and awards
- To inform students of leadership opportunities in the WJDA

### Competencies

At the conclusion of this unit, students will be able to

- list the aims and purposes of the WJDA;
- explain the constitution, its bylaws, and the district structure of the WJDA;
- prepare a local Program of Work;
- list the requirements for the Outstanding Junior Dairyman and complete the application form;
- list the qualifications for director of the WJDA;
- prepare to compete successfully in the WJDA Dairy Show, the Dairy Quiz Bowl, and WJDA contests for creed recital, demonstration, extemporaneous speaking, sire selection, milk and cheese identification, forage management, and dairy cow classification;
- build and sharpen skills and abilities to successfully complete for chapter and individual WJDA awards, such as the Efficient Milk Production Award, Badger Northland Award, Sweepstakes Award, and Dairy Show Achievement Award;
- list the Dairy Show events, understand how to prepare for them, and successfully compete in each contests to finish in the top two groups;
- make decisions about dairy herd management using Dairy Herd Improvement (DHI) computer reports;
- pursue further instruction in WJDA contest, awards, and activities covered in this unit.

*Subject Matter* (Basic skills integration areas are shown in brackets following title.)

The subject matter used in the WJDA unit should follow closely with the annual WJDA Handbook.

- WJDA organizational information
  - Officers, advisory board, consultants
  - Role of officers
  - Constitution and bylaws
  - WJDA districts
  - State and local program of activities
- Necessary forms and information for the WJDA year
  - Report and application deadlines
  - Production report

- Individual membership awards
- Application and score card for Wisconsin Junior Dairymen's Award to determine local, district, and state winners
- Qualifications and application for WJDA director
- Dairy Products Marketing Award
  - Contest procedure, rules, and awards
  - Explanation of Phase I, II, and III
  - Design flow chart
  - Milk marketing orders
- Efficient Milk Production Award
- Dairy Quiz Bowl
  - Oral competition
  - Management considerations
- Dress code
- District WJDA meetings
  - Creed Speaking Contest
    - Contest procedure, rules, and awards
    - Creed and its meaning
    - Judges' score sheet
  - Demonstration Contest
    - Contest procedure, rules, and awards
    - Demonstration score sheet
    - Formulate answers from judges' questions
  - Extemporaneous Speaking Contest
    - Contest procedure, rules, awards
    - Score sheet
    - Review of contest topics
- Sire Selection Contest
  - Contest procedure, rules, and awards
  - Outline of parts 1 and 2
  - Sire selection example and work sheet
  - Holstein Association Linear Classification Program
- State WJDA convention, including daily activities
- Rules of conduct at WJDA convention
- Dairy Show
  - Contest procedure, rules, and awards
  - Entry forms
  - Exhibitor score card
  - Cow production reports
  - Cow health certificates
- Milk and Cheese I.D. Contest
  - Contest procedure, rules, and awards
  - Entry form and practice
- State Fair Milkhouse
  - Overview of WJDA responsibilities
  - Worker information and application form
- Badger Northland Award
- Herdsmanship Award
  - Prepare for Dairy Show exhibit

- Correct cattle care practices
- Sweepstakes Award
- Dairy Show Achievement Award
- Forage Management Contest
  - Contest procedure, rules, and awards
  - Hay, grass, and corn silage study sheets
  - Identify forages
  - Evaluating samples
  - Forage production, harvest, and storage
- Classification Contest
  - Procedure, rules, awards
  - Linear evaluation systems
  - Classify dairy breeds
- Ordering WJDA materials, forms in WJDA handbook
  - Jackets
  - Caps, T-shirts
- Background information, found in WJDA handbook
  - WJDA history
  - Purposes
  - Leadership
  - Membership
  - DHI study sheets
  - WJDA sponsors

### *Motivational Activities*

- Display WJDA trophies and awards.
- Invite WJDA state directors to give class presentations.
- Attend WJDA district meetings and the state convention.
- View films, videotapes, and slides on topics related to this unit.
- Conduct WJDA contests at the local level to encourage students to enter district and state competitions.

### *Learning Activities*

- Participate in a Supervised Agricultural Experience program.
- Invite a local dairy producer to be a guest speaker.
- Take a tour of a local dairy processing plant, veterinary clinic, or artificial insemination facility.
- Collect and send forage samples to a state forage-testing laboratory and share the results with the class.
- Visit or work in the milk house at the state fair or the World Dairy Expo.
- Attend local, state, and national meetings, shows, and conventions of dairy breed associations.

## *Instructional Materials*

### **Textbooks and References**

*Dairy Cattle Judging Techniques* by George W. Trimberger et al.. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1987. Available from National Farm Book Company.  
*Official Junior Dairyman's Association Handbook*. Madison, WI: Wisconsin Department of Public Instruction, 1988.

### **Bulletins and Pamphlets**

The following are available from the Cooperative Extension Service.

*Extra Services Available from DHI*. A3050.  
*How DHI Cow Records Are Calculated*. A2989.  
*Raising Dairy Replacements*. NCR205.  
*What to Expect When You Join DHIA*. A2735.  
*Your DHI Rolling Herd Average (RHA)*. A3244.  
*Your DHI 305-Day ME Lactation Average (LA)*. A3258.

### **Periodicals**

*Dairy Herd Management*  
*Hoard's Dairyman*

### **Computer Software**

The following is available from ACS Software Publishing.

*Dairy Management Game*. ACS 214. Apple.

The following is available from the Cooperative Extension Service.

*Design Considerations: Least Cost Dairy Ration Computer Program*. R3140.

The following are available from Mid States Agri-Technology Associates, Ltd.

*Dairy Ration Master*. Apple.  
*Micro-Tutor: Dairy Production*. Apple, IBM.

The following are available from Midwest Agribusiness Services, Inc.

*Agri-ID: The Dairy Cow*. Apple II.  
*Agri-Quiz: Dairy I*. Apple, IBM.  
*Agri-Quiz: Dairy II*. Apple, IBM.

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### On-line Computer Networks

The following are available from Ag Ed Network, Agri Data Resources, Inc.

*Computers for Dairy Improvement.* HS216.

*Dairy Cooperative Membership.* HS112.

### Films, Videotapes, and Slides

The following is available from Babson Brothers Dairy Research Service.

*Making Your Cows Worth More.* (16mm film, color, 30 minutes.) 1977.

The following are available from the Bureau of Audio Visual Instruction.

*Dairy Productions—From Moo to You.* 00673 (16mm film, color, 14 minutes). Centron, 1975.

*Improving Milk Quality: Managing Your Environment.* 19111 (VHS videotape, color, 18 minutes).

University of Wisconsin, Agricultural Journalism Video Unit, 1987.

*Improving Milk Quality: Using Monitoring Systems.* 11912 (VHS videotape, color, 18 minutes).

University of Wisconsin, Agricultural Journalism Video Unit, 1987.

The following are available from Photocom.

*Animal Acquisition and Reproduction.* 30-678 (VHS videotape, 38 minutes).

*Lactation.* 30-679 (VHS videotape, 39 minutes).

### Equipment and Facilities

Milk-testing laboratory

Milk-testing equipment

Centrifuge

Garver/Babcock milk test

Glassware

Sulfuric acid or Shane reagent

Timer

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**Instructional Resources****A & L Publications, Inc.**

Station A, Box F  
Champaign, IL 61820

**A and T Equine Center**

1904 Zipperer Road  
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**Academic Press, Inc.**

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**ACS Software Publishing**

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**Ag Ed Network**

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Oregon City, OR 97045

**Agricultural Relations Council**

1629 K Street NW, Suite 1100  
Washington, DC 20006

**Agricultural Resource Management  
Division**

Plant Industry Bureau  
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Madison, WI 53708  
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**Agriculture Sextant Systems, Inc.**

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Milwaukee, WI 53201

**AgriData Resources, Inc.**

330 East Kilbourn Avenue  
Milwaukee, WI 53202  
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**Agri-Education, Inc.**

815 Shakespeare  
P.O. Box 456  
Stratford, IA 50249  
Tel. (515) 838-2785

**Agri-Farm Publications, Inc.**

1019 Market Street, Box 43  
Gowrie, IA 50543  
Tel. (515) 352-3303

**Agronomy Publications**

P.O. Box 83  
River Falls, WI 54022  
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**Allstate**

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**The Aluminum Association**

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Washington, DC 20006  
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**American Angus Association**

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Joseph, MO 64501

**American Association of Vocational  
Instructional Materials (AAVIM)**

120 Driftmier Engineering Center  
Athens, GA 30602  
Tel. (404) 542-2586



**American Breeders Service**  
P.O. Box 459  
De Forest, WI 53532  
Tel. (608) 846-3721

**American Chemical Society**  
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Washington, DC 20036  
Tel. (800) 227-5558

**American Enterprise Institute for  
Public Policy Research**  
1150 17th Street NW  
Washington, DC 20036

**American Fisheries Society**  
5410 Grosvenor Lane, Suite 110  
Bethesda, MD 20418-2199

**American Forest Institute**  
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Washington, DC 20036

**American Forestry Association**  
919 17th Street NW  
Washington, DC 20006

**American Institute of Cooperation**  
50 F Street NW, Suite 900  
Washington, DC 20001  
Tel. (202) 347-1080

**American Lung Association**  
1740 Broadway  
New York, NY 10019  
Tel. (212) 315-8700

**American Meat Science Association**  
444 North Michigan Avenue  
Chicago, IL 60611

**American Oil Company**  
910 South Michigan Avenue  
Chicago, IL 60680

**American Petroleum Institute**  
Public Relations Department  
1220 L Street NW  
Washington, DC 20005

**American Phytopathological Society**  
3340 Pilot Knob Road  
St. Paul, MN 55121  
Tel. (800) 328-7560

**American Plywood Association**  
1119 A Street  
Tacoma, WA 98401

**American Poultry and Hatchery  
Foundation**  
521 East 63rd Street  
Kansas City, MO 64110

**American Printing and Publishing  
Company**  
520 Commonwealth Avenue  
Boston, MA 02215-2605  
Tel. (617) 247-0022

**American Publishing Company**  
Division of American Printing Company, Inc.  
P.O. Box 7125  
Madison, WI 53713  
Tel. (608) 271-6544

**American Quarter Horse Association**  
P.O. Box 200  
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**American Society of Agricultural Engineers**  
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Tel. (616) 429-0300

**American Society of Agronomy**  
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**American Society for Metals International**  
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**American Soybean Association**  
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**American Technical Publishers**

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**American Technical Society**

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**American Vocational Association (AVA)**

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**American Welding Society**

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**Brenton Publishers**  
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Madison, WI 53715-2499

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**California Department of Fish and Game**  
Office of Procurement  
Documents Section  
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Sacramento, CA

**Cambridge Films**  
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**Career Aids, Inc.**  
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**Cargill, Inc.**  
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**Caxton Printers, Ltd.**  
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**Cooperative Extension Service**  
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**Cooperative League**  
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**Elsevier Science Publishing Co., Inc.**

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**Encyclopaedia Britannica Educational Corporation**

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**Engine Service Association**

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**Farm Quarterly**

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**Heifer Project International**  
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Little Rock, AR 72202  
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**Hobar Publications**

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**Holland House Press**

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**International Harvester Company**  
Product Support Center  
P.O. Box 4521  
Oak Brook, IL 60521

**Interstate Printers and Publishers, Inc.**  
19 North Jackson Street  
P.O. Box 50  
Danville, IL 61834-0050  
Tel. (800) 843-4774

**Intertec Publishing Corporation**  
Subsidiary of Macmillan, Inc.  
55 East Jackson Boulevard, Suite 1100  
Chicago, IL 60604  
Tel. (312) 922-2435

**Iowa State University**  
Department of Animal Science  
Ames, IA 50011

**Iowa State University Press**  
Press Building  
2121 South State Avenue  
Ames, IA 50010  
Tel. (515) 292-0140

**Irwin Company**  
1818 Ridge Road  
Homewood, IL 60430

**Jam Handy Organization**  
2821 East Grand Boulevard  
Detroit, MI 48202

**Jefferson Publications, Inc.**  
44 South Old Rand Road, Box 788  
Lake Zurich, IL 60047  
Tel. (312) 438-4114

**John Deere Company**  
Distribution Service Center  
1400 Third Avenue  
Moline, IL 61265-1304

**John Deere Film Library**  
John Deere Road  
Moline, IL 61265

**John Deere Service Training**  
Department F  
John Deere Road  
Moline, IL 61265

**Karen Ann Publications**  
Forest Lake, MN 55025

**Keats Publishing, Inc.**  
P.O. Box 876  
New Canaan, CT 06840  
Tel. (203) 966-8721

**Kendall/Hunt Publishing Company**  
Subsidiary of William C. Brown Company,  
Publishers  
(Orders to William C. Brown Company,  
Publishers)

**Walter J. Klein Company, Ltd.**  
6311 Carmell Road  
P.O. Box 2087  
Charlotte, NC 28211

**Alfred A. Knopf, Inc.**  
Subsidiary of Random House, Inc.  
Orders to: 400 Hahn Road  
Westminster, MD 21157  
Tel. (800) 638-6460

**F. V. Kosikowski and Associates**  
P.O. Box 139  
Brooktondale, NY 14817  
Tel. (607) 272-7779

Krieger Publishing Company, Inc.  
P.O. Box 9542  
Melbourne, FL 32902-9542  
Tel. (407) 724-9542

LaMotte Chemical Products Company  
P.O. Box 329  
Chestertown, MD 21620

Land O'Lakes Agricultural Services  
Fort Dodge, IA

Lea & Febiger, Publishers  
600 South Washington Square  
Philadelphia, PA 19106-4198  
Tel. (800) 433-3850

Leisure Time Products  
3M Company  
700 Ward Drive  
Santa Barbara, CA 93111  
Tel. (805) 964-8711

Lewis Publishers, Inc.  
121 South Main Street  
P.O. Drawer 519  
Chelsea, MI 48118  
Tel. (800) 525-7894

The James F. Lincoln Arc Welding  
Foundation  
P.O. Box 17035  
Cleveland, OH 44117-0035

J.B. Lippincott Company  
Subsidiary of Harper & Row Publishers, Inc.  
East Washington Square  
Philadelphia, PA 19105  
Tel. (800) 242-7737

Little, Brown and Company  
Division of Time, Inc.  
Orders to: 200 West Street  
Waltham, MA 02254  
Tel. (800) 343-9204

Longwood Publishing Group, Inc.  
27 South Main Street  
Wolfeboro, NH 03894-2069

Los Alamos Laboratory  
University of California  
Box 1663  
Los Alamos, CA 93440  
Tel. (505) 667-5061

Macmillan Publishing Company, Inc.  
Division of Macmillan, Inc.  
Orders to: Front and Brown Streets  
Riverside, NJ 08370  
Tel. (609) 461-6500

Madison Area Technical College  
3550 Anderson Street  
Madison, WI 53704  
Tel. (608) 246-6100

Manufacturing Chemists Association  
2501 M Street NW  
Washington, DC 20037  
Tel. (202) 887-1100

McGraw-Hill Book Company  
1221 Avenue of the Americas  
New York, NY 10020  
Tel. (800) 722-4726

David McKay Company, Inc.  
Subsidiary of Random House, Inc.  
Orders to: 400 Hahn Road  
Westminster, MD 21157  
Tel. (800) 638-6460

McKnight and McKnight, Publishers  
Bloomington, IL 61702

Media Resources Center  
Film/Video Library  
121 Pearson Hall  
Iowa State University  
Ames, Iowa 50011  
Tel. (515) 294-8022

Meister Publishing Company  
37841 Euclid Avenue  
Willoughby, OH 44094  
Tel. (216) 942-2000

**Merchants Publishing Company**  
20 Mills Street  
Kalamazoo, MI 49001  
Tel. (616) 345-1175

**Meredith Corporation**  
Better Homes and Gardens  
1716 Locust Street  
Des Moines, IA 50336  
Tel. (515) 284-2369

**Merrill Publishing Company**  
Division of Bell & Howell Company  
1300 Alum Creek Drive  
Columbus, OH 43216  
Tel. (800) 848-6205

**Micro Learningware**  
(Orders to Hobar Publications.)

**Mid States Agri-Technology Associates, Ltd.**  
801 Barberry Place  
West Bend, WI 53095  
Tel. (414) 334-2974

**Midwest Agribusiness Services, Inc.**  
4575 Highway 33  
Allenton, WI 53002  
Tel. (414) 629-5302

**Midwest Breeders**  
Shawano, WI 54166

**Midwest Plan Service**  
Iowa State University Press  
2121 South State Avenue  
Ames, IA 50010

**Milk Industry Foundation**  
888 16th Street NW  
Washington, DC 20006

**Miller Electric Manufacturing Company**  
1635 West Spencer  
Appleton, WI 54914  
Tel. (414) 734-9821

**Millers Saddlery**  
235 Murray Hill Parkway  
East Rutherford, NJ 07073-2114

**Minnesota Department of Public Education**  
Division of Vocational-Technical Education  
550 Cedar Street  
St. Paul, MN 55101

**Minnesota Extension Service**  
University of Minnesota  
3 Coffey Hall  
St. Paul, MN 55108  
Tel. (612) 625-8173

**ML Creations**  
c/o Mark LaBarbera  
1371 Maxine Circle  
Shakopee, MN 55379

**Modern Talking Picture Service, Inc.**  
Film Scheduling Department  
5000 Park Street North  
St. Petersburg, FL 33709

**Morrison Publishing Company**  
14 Brown Street  
Warren, RI 02885

**John Muir Publications**  
(Distributed by W. W. Norton & Co., Inc.)

**NAGT-Computer**  
Attn.: Robert Burger  
Department of Geology  
Smith College  
Northampton, MA 01063

**NAL/Penguin**  
(See New American Library Books.)

**Nasco**  
901 Janesville Avenue  
Fort Atkinson, WI 53538  
Tel. (800) 558-9595

**National Association of Geology  
Teachers, Inc.**  
1041 New Hampshire Street  
Lawrence, KS 66044

**National Audio Visual Center**  
8700 Edgeworth Drive  
Capitol Heights, MD 20743-3701

**National Dairy Council**  
6300 North River  
Rosemont, IL 60018  
Tel. (312) 696-1020

**National Farm Book Company**  
P.O. Box 206  
5149 Highway T  
Amherst, WI 54406

**National Farm Medicine Center**  
510 North St. Joseph Avenue  
Marshfield, WI 54449

**National FFA Supply Service**  
5632 Mt. Vernon Memorial Highway  
P.O. Box 15160  
Alexandria, VA 22309

**National Fluid Power Association**  
3333 North Mayfair Road  
Milwaukee, WI 53222  
Tel. (414) 778-3344

**National Food and Energy Council**  
409 Vandiver West, Suite 202  
Columbia, MO 65202  
Tel. (314) 875-7155

**National 4-H Council**  
150 North Washburn  
Chicago, IL 60606

**National Livestock and Meat Board**  
444 North Michigan Avenue  
Chicago, IL 60611  
Tel. (312) 467-5520

**National Milk Producer's Federation**  
30 F Street NW  
Washington, DC 20001

**National Plant Food Institute**  
1700 K Street  
Washington, DC 20006

**National Safety Council**  
444 North Michigan Avenue  
Chicago, IL 60611  
Tel. (312) 527-4800

**National Science Teachers Association**  
1742 Connecticut Avenue NW  
Washington, DC 20009  
Tel. (202) 265-4150

**National Vocational Agriculture Book Company**  
Sheldon, WI 54766

**National Water Well Association**  
500 West Wilson Bridge Road  
Worthington, OH 43085

**National Wildlife Federation**  
Attn: Film Librarian  
1412 16th Street NW  
Washington, DC 20036

**Navy Training Publications Center**  
(Orders to the U.S. Government Printing Office.)

**New Age Computer**  
Cleveland, WI 53015

**New Alchemy Institute**  
237 Hatchville Road  
East Falmouth, MA 02536  
Tel. (617) 564-6301

**New American Library Books**  
Orders to: 120 Woodbine Street  
Bergenfield, NJ 07621  
Tel. (800) 526-0275

**News Group Publications**  
730 Third Avenue  
New York, NY 10017  
(212) 557-9200

**North American Students of Cooperation**  
P.O. Box 7715  
Ann Arbor, MI 48107  
Tel. (313) 663-0889

**North Dakota State University**  
State University Station  
Fargo, ND 58105  
Tel. (701) 237-8643

**Northern States Power Company**  
414 Nicollet Mall  
Minneapolis, MN 55401  
Tel. (612) 330-5500

**Northland Press**  
Division of Justin Industries  
Box N  
Flagstaff, AZ 86002  
Tel. (800) 346-3257

**W.W. Norton and Company, Inc.**  
500 Fifth Avenue  
New York NY 10010  
Tel. (800) 223-2588

**Ohio Agricultural Education Curriculum  
Materials Service**  
2120 Fyffe Road, Room 254  
Ohio State University  
Columbus, OH 43210-1099

**Ortho Books**  
Ortho Information Services  
Chevron Chemical Co.  
Consumer Products Division  
One Crossroads of Commerce, Suite 1000  
Rolling Meadows, IL 60008  
Tel. (312) 870-3430

**Outdoor Life Books**  
(Orders to Crown Publishers, Inc.)

**Overlook Press**  
Orders to: Rural Route 1, Box 496  
Woodstock, NY 12498  
Tel. (800) 631-3577

**Owatonna Tool Company**  
Division of Sales  
655 Eisenhower Plaza  
Owatonna, MN 55060  
Tel. (507) 451-5310

**Pace Publications**  
Distributed by: Worldwide Books  
1001 West Seneca Street  
Ithaca, NY 14850  
Tel. (607) 272-9200

**Park Publishing, Inc.**  
124 South Main Street  
Stillwater, MN 55082  
Tel. (612) 639-0935

**Pegasus**  
Affiliate of Bobbs-Merrill Company, Inc.  
4300 West 62nd Street  
P.O. Box 7080  
Indianapolis, IN 46206  
Tel. (800) 428-3750

**Pennsylvania Instructional Materials  
Service**  
Department of Agricultural Education  
102 Armsby Building  
Pennsylvania State University  
University Park, PA 16802

**Pergamon Books, Inc.**  
Maxwell House  
Fairview Park  
Elmsford, NY 10523  
Tel. (914) 592-7700

**Phoenix/BFA Films**  
468 Park Avenue South  
New York, NY 10016  
Tel. (800) 221-1274

**Photocom**  
P.O. Box 3155  
Pismo Beach, CA 93449

**Pine Mountain Press, Inc.**  
(Orders to Hobar Publications.)

**Pioneer Hi-Bred International, Inc.**  
(Film requests to Modern Talking Picture  
Service, Inc.)

**Pope and Young Club**  
6471 Richard Avenue  
Placerville, CA 95667  
Tel. (916) 621-1133

**Popular Science Publishing Company**  
Audio Visual Division  
355 Lexington Avenue  
New York, NY 10017

**Potash and Phosphate Institute**  
2801 Buford Highway NE, Suite 401  
Atlanta, GA 30329

**Prentice Hall**  
Division of Simon & Schuster  
Orders to: Old Tappan Road  
Old Tappan, NJ 07675  
Tel. (201) 767-5054

**Public Broadcasting Service**  
1320 Braddock Place  
Alexandria, VA 22314-1698  
Tel. (703) 739-5000

**Purdue University Cooperative Extension Service**  
Lafayette, IN 47907  
Tel. (317) 749-8111

**Putnam Publishing Group**  
200 Madison Avenue  
New York, NY 10016  
Tel. (800) 631-8571

**Ralston Purina Company**  
Checkerboard Square  
St. Louis, MO 63134-0001  
Tel. (314) 982-1000

**Randolf Concrete Products**  
Park Place East  
Carlstadt, NJ 07072  
Tel. (201) 438-3700

**Red Wing Business Systems, Inc.**  
610 Main Street  
Red Wing, MN 55066  
Tel. (612) 388-1106

**Remington Arms Company, Inc.**  
Film requests to: Karol Media  
22 Riverview Drive  
Wayne, NJ 07470

**Research Products Corporation**  
1015 East Washington Avenue  
Madison, WI 53703  
Tel. (608) 252-3311

**Reston Publishing Company**  
(Orders to Prentice Hall.)

**Richland Observer**  
P.O. Box 31  
Richland Center, WI 53581  
Tel. (608) 647-6141

**Rodale Press, Inc.**  
33 East Minor Street  
Emmaus, PA 18098  
Tel. (800) 527-8200

**Ronald Press Company**  
15 East 26th Street  
New York, NY 10016

**A.I. Root Company**  
Box 706  
Medina, OH 44258-0706  
Tel. (800) 289-7668

**Sage Systems**  
Tr. 1, Box 96A  
Lovelock, NV 89419  
Tel. (702) 273-2183

**St. Martin's Press, Inc.**  
Subsidiary of Macmillan Publishing Company  
175 Fifth Avenue  
New York, NY 10010  
Tel. (800) 221-7945

**Howard H. Sams and Company**  
Division of Macmillan, Inc.  
4300 West 62nd Street  
Indianapolis, IN 46268  
Tel. (800) 428-7267

**Sandia National Laboratories**  
P.O. Box 5800  
Albuquerque, NM 87815  
Tel. (505) 844-5678

**San Jacinto Publishing Company**  
c/o Texas A & M University Press  
Drawer C  
College Station, TX 77843  
Tel. (409) 845-1436

**W. B. Saunders Company**

Subsidiary of Harcourt Brace Jovanovich, Inc.  
Orders to: 6277 Sea Harbor Drive  
Orlando, FL 32821  
Tel. (800) 782-4479

**Science Research Associates, Inc.**

Orders to: P.O. Box 5380  
Chicago, IL 60680-5380  
Tel. (800) 621-0476

**Charles Scribner's Sons**

(Orders to Macmillan Publishing Company,  
Inc.)

**Shannon Software, Ltd.**

P.O. Box 6126  
Falls Church, VA 22046

**Sheridan House, Inc.**

145 Palisade Street  
Dobbs Ferry, NY 10522  
Tel. (914) 693-2410

**Shopware**

(Orders to Hobar Publications.)

**Sierra Club Books/Ballentine**

Division of Random House, Inc.  
Orders to: 400 Hahn Road  
Westminster, MD 21157  
Tel. (301) 848-1900

**Soil and Water Conservation Society**

7515 Northeast Ankeny Road  
Ankeny, IA 50021-9764  
Tel. (515) 289-2331

**Specialized Data Systems, Inc.**

2117 Continental Lane  
P.O. Box 8278  
Madison, WI 53708  
Tel. (608) 241-5050

**Specialty Vehicle Institute of America**

Siegel and Associates  
19725 Sherman Way  
Canoga Park, CA 91306

**Sperry New Holland**

M.S. 224  
New Holland, PA 17557

**Sperry Rand Corporation**

Troy, MI

**Spur Publications**

P.O. Box 5895  
Columbia, SC 29250  
Tel. (803) 799-4540

**Soil Conservation Service**

6515 Watts Road  
Madison, WI 53719  
Tel. (608) 264-5569  
(Materials also available from county SCS  
offices.)

**Stackpole Books, Inc.**

Division of Commonwealth Communications  
Company  
P.O. Box 1831  
Cameron and Kelker Streets  
Harrisburg, PA 17105  
Tel. (800) 732-3669

**Stellite Division**

Cabott Corporation  
P.O. Box 3346  
Wenatchee, WA 98801  
Tel. (509) 663-2165

**Sterling Publishing Company, Inc.**

2 Park Avenue  
New York, NY 10016  
Tel. (800) 367-9692

**Sternco Industries**

Harrison, NJ 07029

**Stipes Publishing Company**

P.O. Box 526  
10-12 Chester Street  
Champaign, IL 61820  
Tel. (217) 356-8391



**Stoody Company**  
P.O. Box 1901  
Industry, CA 91749  
Tel. (818) 968-0717

**Storey Communications, Inc.**  
(Orders to **Harper & Row Publishers, Inc.**)

**Sunset Books/Lane Publishing Company**  
80 Willow Road  
Menlo Park, CA 94025-3691  
Tel. (800) 277-7346

**The Sunstone Press**  
Subsidiary of Sunstone Corporation  
P.O. Box 2321  
Santa Fe, NM 87504-2321  
Tel. (505) 988-4418

**Teaching Aids, Inc.**  
P.O. Box 1798  
Costa Mesa, CA 92628

**Technical Publications, Inc.**  
10114 Wyandotte Street  
Kansas City, MO 64150

**Technical Systems, Inc.**  
715 Raymond  
St. Paul, MN 55114

**TFH Publications, Inc.**  
211 West Sylvania Avenue  
Neptune, NJ 07753  
Tel. (800) 631-2188

**Thomson Publications**  
P.O. Box 9335  
Fresno, CA 93791  
Tel. (209) 435-2163

**Tri-State Breeders Co-op**  
Department of Public Relations  
E10890 Penny Lane  
Baraboo, WI 53913  
Tel. (608) 356-8357

**Union Carbide Corporation**  
Old Ridgebury Road  
Danbury, CT 06810  
(203) 794-2000

**Union Carbide Corporation**  
Linde Division  
270 Park Avenue  
New York, NY 10017

**United States Department of Agriculture**  
(Orders to the U.S. Government Printing Office.)

**United States Department of Education**  
400 Maryland Avenue SW, Suite 3073  
Washington, DC 20202  
Tel. (202) 472-5812

**United States Department of Energy**  
1000 Independence SW  
Washington, DC 20585

**United States Department of**  
(Orders to the U.S. Government Printing Office.)

**United States Government Printing Office**  
Superintendent of Documents  
Washington, DC 20402-9325  
Tel. (202) 783-3238

**U.S. Steel Company**  
Chicago Film Distribution Center  
208 South La Salle Street  
Chicago, IL 60604

**United Transparencies, Inc.**  
P.O. Box 688  
Binghamton, NY 13902

**United World Films, Inc.**  
221 Park Avenue South  
New York, NY 10003

**Universe Publishing Company**  
185 West Demarest Avenue  
Englewood, NJ 07631  
Tel. (201) 567-4296

**University of Alberta**  
Extension Services  
Edmonton, Alberta, CANADA  
T6G2E1  
Tel. (403) 432-3111



**University of Illinois Press**  
54 East Gregory Drive  
Champaign, IL 61820  
Tel. (217) 333-0950

**University of Missouri**  
Department of Agricultural Engineering  
Columbia, MO 65211

**University of Oklahoma**  
1005 Asp Avenue  
Norman, OK 73019

**University of Wisconsin-La Crosse Film  
Rental Library**  
Florence Wing Communications Center  
1705 State Street  
La Crosse, WI 54601

**University of Wisconsin-Platteville**  
Department of Horticulture  
Platteville, WI 53818

**University of Wisconsin Press**  
114 North Murray Street  
Madison, WI 53715  
Tel. (608) 262-8782

**University of Wisconsin-River Falls**  
Agricultural Education Department  
324 Agricultural Science Building  
River Falls, WI 54022  
Tel. (715) 425-3555

**University of Wisconsin-Stevens Point**  
College of Natural Resources  
Department of Soils  
Stevens Point, WI 54481  
Tel. (715) 346-3618

**D. Van Nostrand Company**  
120 Alexander Street  
Princeton, NJ 08540

**Van Nostrand Reinhold Company**  
Division of International Thomson Publishing  
Corporation  
Orders to: 7625 Empire Drive  
Florence, KY 41042  
Tel. (606) 525-6600

**Vector Publications**  
1945 Sharondale Avenue  
St. Paul, MN 55113

**Venard Films**  
Box 1332  
Peoria, IL 61654

**Visual Education, Inc.**  
Southern Building  
1425 H Street NW  
Washington, DC 20005

**Vocational Agriculture Services**  
1401 South Maryland Drive  
Urbana, IL 61801

**Vocational Education Productions**  
B A & E, Room 5  
California Polytechnic State University  
San Luis Obispo, CA 93407

**Vocational Media Associates**  
(Formerly Prentice-Hall Media)  
P.O. Box 1050  
Mount Kisco, NY 10549-9989  
Tel. (914) 631-8300

**Vocational Services Center**  
245 South Kerper Boulevard  
Dubuque, IA 52001  
Tel. (319) 556-7040

**Wadsworth Publishing Company, Inc.**  
Orders to: Wadsworth, Inc.  
Distribution Center  
7625 Empire Drive  
Florence, KY 41042  
Tel. (800) 354-9706

**Wallace-Homestead Book Company**  
Orders to: P.O. Box 2165  
Radnor, PA 19089-9931  
Tel. (800) 638-3822

**Franklin Watts, Inc.**  
387 Park Avenue South  
New York, NY 10016  
Tel. (800) 672-6672

**Webb Book Publishing Company**  
1999 Shepard Road  
St. Paul, MN 55116

**Westview Press**  
5500 Central Avenue  
Boulder, CO 80301  
Tel. (303) 444-3541

**John Wiley and Sons, Inc.**  
Orders to: Eastern Distribution Center  
One Wiley Drive  
Somerset, NJ 08873  
Tel. (201) 469-4400  
or  
Western Distribution Center  
1530 South Redwood Road  
Salt Lake City, UT 84101  
Tel. (801) 972-5828

**Williams and Wilkins**  
Orders to: P.O. Box 1496  
Baltimore, MD 21203  
Tel. (800) 638-0672

**Williamson Publishing Company**  
Church Hill Road  
P.O. Box 185  
Charlotte, VT 05445  
Tel. (802) 425-2102

**Windsor Books**  
Division of Windsor Marketing Corporation  
P.O. Box 280  
Brightwaters, NY 11718

**Wisconsin Agri-Business Council, Inc.**  
1400 East Washington Avenue  
Madison, WI 53703  
Tel. (608) 255-7976

**Wisconsin Agriculture Statistics Service**  
P.O. Box 9160  
Madison, WI 53715  
Tel. (608) 266-1641

**Wisconsin Association for Vocational  
Agricultural Instructors (WAVAI)**  
518 Merrill Street  
Sparta, WI 54656  
Tel. (608) 269-2107

**Wisconsin Canned Vegetable Council**  
222 North Midvale Boulevard  
Madison, WI 53705  
Tel. (608) 231-2250

**Wisconsin Dairies Cooperative**  
Route 3  
Baraboo, WI 53913  
Tel. (608) 356-8316

**Wisconsin Dairy Herd Improvement  
Cooperative**  
5301 Tokay Boulevard  
Madison, WI 53711  
Tel. (800) 362-3939

**Wisconsin Department of Agriculture,  
Trade and Consumer Protection (DATCP)**  
801 West Badger Road  
P.O. Box 8911  
Madison, WI 53708  
Tel. (800) 362-3020

**Wisconsin Department of Industry, Labor  
and Human Relations**  
P.O. Box 7903  
Madison, WI 53707  
Tel. (608) 266-3131

**Wisconsin Department of Natural  
Resources**  
101 South Webster Street  
Madison, WI 53707  
Tel. (608) 266-2621

**Wisconsin Department of Natural  
Resources**  
Education Section  
Bureau of Information and Education  
P.O. Box 7921  
Madison, WI 53707-7921  
Tel. (608) 266-6790

**Wisconsin Department of Natural  
Resources —La Crosse Office**  
3550 Mormon Coulee Road  
La Crosse, WI 54601  
Tel. (608) 785-9020

Wisconsin Department of Public Instruction  
P.O. Box 7841  
Madison, WI 53707  
Tel. (608) 266-3390

Wisconsin Electric Cooperative Association  
2981 Yarmouth Greenway Drive  
Madison, WI 53711  
Tel. (608) 273-0420

Wisconsin Farm Bureau Federation  
7010 Mineral Point Road  
Madison, WI 53717  
Tel. (608) 833-8070

Wisconsin Federation of Cooperatives  
30 West Mifflin Street  
Madison, WI 53703  
Tel. (608) 258-4400

Wisconsin Job Service  
206 North Broom Street  
Madison, WI 53703  
Tel. (608) 266-1492

Wisconsin Public Service  
600 North Adams Street  
Green Bay, WI 54301  
Tel. (414) 433-1598

Wisconsin State FFA Executive Secretary  
Wisconsin Department of Public Instruction  
P.O. Box 7841  
Madison, WI 53707  
Tel. (608) 267-9255

Wisconsin State Horse Council  
287 Animal Sciences Building  
1675 Observatory Drive  
Madison, WI 53706  
Tel. (608) 263-4303

Wisconsin Women's Council  
30 West Mifflin Street, Suite 512  
Madison, WI 53702  
Tel. (608) 266-2219

Vocational Studies Center  
964 Educational Sciences Building  
1025 West Johnson Street  
University of Wisconsin-Madison  
Madison, WI 53706  
Tel. (608) 263-3696

Xerox Films  
One Pickwick Plaza  
P.O. Box 6710  
Greenwich, CT 06836  
Tel. (203) 625-5600

Yaker Environmental Systems, Inc.  
P.O. Box 18  
Stanton, NJ 08885

## Suggested Periodicals

This composite list of periodicals, the titles of which appear in the instructional units, includes mailing addresses, frequency of publication, and in most cases, subscription information. To the best of our knowledge, subscription fees were correct at the time of publication.

*Adweek Midwest*, 435 North Michigan Avenue, No. 819, Chicago, IL 60611. (312) 467-6500. Subscription fee: \$60, weekly.

*Ag Consultant* (formerly *Ag Consultant and Fieldman*), Meister Publishing Company, 38741 Euclid Avenue, Willoughby, OH 44094. (216) 942-2000. Subscription fee: \$12, nine issues/year.

*Agricultural Computing*, Doane Publishing, 11701 Borman Drive, St. Louis, MO 63146. (314) 569-2700. Subscription fee: \$72, monthly.

*Agricultural Education*, Agricultural Education Magazine, Inc., 1803 Rural Point Road, Mechanicsville, VA 23111. (804) 746-3538. Subscription fee: \$7, monthly.

*Agricultural Engineering*, American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085-9659. (616) 429-0300. Subscription fee: \$28, seven issues/year.

*Agricultural Outlook*, United States Department of Agriculture, Environmental Research Service, P.O. Box 1608, Rockville, MD 20850. (301) 953-2515. Subscription fee: \$22, monthly, except January and February combined.

*Agricultural Research*, U.S. Department of Agriculture, Room 318, Building 005, BARC-West, Beltsville, MD 20705. (202) 655-4000. Subscription fee: \$11, ten issues/year.

*Agri-View*, 214 West Second Street, P.O. Box 730, Marshfield, WI 54449. (715) 387-6366. Subscription fee: \$36, weekly.

*Alternative Sources of Energy Magazine*, Alternative Sources of Energy, Inc., 107 South Central Avenue, Milaca, MN 56353. (612) 983-6892. Subscription fee: \$58, ten issues/year.

*American Bee Journal*, Dadant and Sons, Inc., Hamilton, IL 62341. (217) 847-3324. Subscription fee: \$11.95, monthly.

*American Beekeeping Federation Newsletter*, American Beekeeping Federation, Inc., 13637 Northwest 39th Avenue, Gainesville, FL 32606. (904) 332-0012. Subscription fee: \$25, bimonthly.

*American Breeders Service Journal*, American Breeders Service, P.O. Box 459, De Forest, WI 53532. (608) 846-3721. No subscription fee, quarterly.

*American Forests*, American Forestry Association, 1516 P Street NW, Washington, DC 20005. (202) 667-3300. Subscription fee: \$24, bimonthly.

*American Fruit Grower*, Meister Publishing Company, 37841 Euclid Avenue, Willoughby, OH 44094. (216) 942-2000. Subscription fee: \$12, monthly.

*American Journal of Veterinary Research*, American Veterinary Medical Association, 930 North Meacham Road, Schaumburg, IL 60196. (312) 885-8070. Subscription fee: \$50, monthly.

*American Lawn Applicator*, Group Interest Enterprises, Inc., 4012 Bridge Avenue, Cleveland, OH 44113. (216) 961-4130. Subscription fee: \$12, 12 issues/year.

*American Nurseryman*, American Nurseryman Publishing Company, 111 North Canal Street, Suite 545, Chicago, IL 60606. (312) 782-5505. Subscription fee: \$35, semimonthly.

*American Society for Horticultural Science Journal*, American Society for Horticultural Science, 701 North Saint Asaph Street, Alexandria, VA 22314-1998. Subscription fee: \$95, bimonthly.

*American Vegetable Grower*, Meister Publishing Company, 37841 Euclid Avenue, Willoughby, OH 44094. (216) 942-2000. Subscription fee: \$12, monthly.

*American Veterinary Medical Association Journal*, American Veterinary Medical Association, 930 North Meacham Road, Schaumburg, IL 60196. (312) 885-8070. Subscription fee: \$50, semimonthly.

*Animal Health and Nutrition* (formerly *Animal Nutrition and Health*), Watt Publishing Company, Sandstone Building, Mt. Morris, IL 61054. (815) 734-4171. Subscription fee: \$12, bimonthly.

*Applied Science and Technology Index*, 950 University Avenue, New York, NY 10452. Monthly, except July.

*Aquaculture Digest*, 9434 Kearny Road, San Diego, CA 92126.

*Aquaculture Magazine*, P.O. Box 2329, Asheville, NC 28802. Subscription fee: \$24, bimonthly.

*Audubon Magazine*, National Audubon Society, 950 Third Avenue, New York, NY 10022. (212) 546-9100. Subscription fee: \$16, bimonthly.

*Beef*, Webb Company, 1999 Shepard Road, St. Paul, MN 55116. (612) 690-7200. Subscription fee: \$15, monthly.

*Brown Swiss Bulletin*, Brown Swiss Cattle Breeders Association of USA, 800 Pleasant Street, Box 1038, Beloit, WI 53511-1038. (608) 365-4474. Subscription fee: \$8, monthly.

*Buckeye Nurseryman*, 2021 East Dublin-Grenville Road, Suite 185, Columbus, OH 43229.

*Cat Fancy*, Fancy Publications, Inc., Box 6050, Mission Viejo, CA 92690. (714) 855-8822. Subscription fee: \$17.97, monthly.

*Chilton's Food Engineering*, Chilton Company, Chilton Way, Box 2035, Radnor, PA 19089. (215) 964-4440. Subscription fee: \$36, monthly.

*Computers and Electronics in Agriculture*, Elsevier Science Publisher B.V., Box 211, 1000-AE, Amsterdam, Netherlands. Subscription fee: \$81.92, quarterly.

*Concrete Construction*, Concrete Construction Publications, Inc., 426 South Westgate, Addison, IL 60101. (312) 543-0870. Subscription fee: \$15, monthly.

*Conservation*, National Wildlife Federation, 1412 16th Street NW, Washington, DC 20036. Biweekly.

*Conservation Education*, Young People's Trust for Endangered Species, 19 Quarry Street, Guildford, Surrey GU1 3EH, England. Subscription fee: free, three issues/year.

*Conservationist*, Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233. (518) 457-6668. Subscription fee, bimonthly.

*Consumers' Research Magazine*, Consumers' Research, Inc., 517 Second Street NE, Washington, DC 20002. (202) 546-1713. Subscription fee: \$18, monthly.

*Cooperative Partners*, Cenex/Land O' Lakes Ag Services, Box 64089, St Paul, MN 55164 0089. Subscription fee: \$5 for nonmembers, \$1 for members; eight issues/year.

*Cooperative Farmer*, Southern States Cooperative, Inc., Box 26234, Richmond, VA 23260. (804) 281-1317. Subscription fee: \$10, nine issues/year.

*Cornell Veterinarian*, Cornell Veterinarian, Inc., Ithaca, NY 14853. Subscription fee: \$25, quarterly.

*The Country Today*, 611 South Farwell Street, P.O. Box 570, Eau Claire, WI 54702. (715) 833-9270. Subscription fee: \$16, weekly.

*Countryside*, Gilbertson & Page, Ltd., Corry's Farm, Roestock Lane, Colney Heath, Herts AL4 0QW, England. (0727) 22614. Subscription fee, monthly.

*Crop Production*, U.S. Crop Reporting Board, Washington, DC 20250. (202) 655-4000. Subscription fee: \$30, 16 issues/year.

*Crop Research*, Scottish Academic Press Ltd., 33 Montgomery Street, Edinburgh EH7 5JX, Scotland. Subscription fee: \$35, two issues/year.

*Crop Science*, Crop Science Society of America, 677 South Segoe Road, Madison, WI 53711. (608) 273-8080. Subscription fee: \$65, bimonthly.

*Crops and Soils*, American Society of Agronomy, 677 South Segoe Road, Madison, WI 53711. (608) 274-1212. Subscription fee: \$10, nine issues/year.

*Curran's Ginseng Farmer*, D.F. Curran Productions, P.O. Box 7067, Missoula, MT 59807.

*Dairy: The Magazine for the Dairy Herd Improvement Association*, Webb Publishing Company, 1999 Shepard Road, St. Paul, MN 55116. Subscription fee: \$15, monthly.

*Dairy Goat Journal*, Kane Communications, Inc., 401 North Broad Street, Philadelphia, PA 19102. (215) 925-9744. Subscription fee: \$19, monthly.

*Dairy Herd Management*, Miller Publishing Company, 12400 Whitewater Drive, Suite 160, Box 2400, Minnetonka, MN 55343. (612) 931-0211. Subscription fee: \$18, monthly.

*Dairyman*, Robert M. McCune, Publisher, 14970 Chandler, Box 819, Corona, CA 91718. (714) 735-2730. Subscription fee: \$10, monthly.

*Dairymen's Digest—North Central Region Edition*, North Central Region of Associated Milk Producers, Inc., Box 455, New Ulm, MN 56073. Subscription fee: \$6, monthly.

*Defenders*, Defenders of Wildlife, 1244 19th Street NW, Washington, DC 20036. Bimonthly.

*Doane's Agricultural Report*, Doane Publishing, 11701 Borman Drive, St. Louis, MO 63146. (314) 569-2700. Subscription fee: \$62, weekly.

*Dog Fancy*, Fancy Publications, Inc., Box 6050, Mission Viejo, CA 92690. (714) 855-8822. Subscription fee: \$17.97, monthly.

*Dog World*, Maclean Hunter Publishing Company, 300 West Adams Street, Chicago, IL 60606. (312) 726-2802. Subscription fee: \$22, monthly.

*Draft Horse Journal*, Draft Horse Journal, Inc., Box 670, Waverly, IA 50677. (319) 352-4046. Subscription fee: \$14, quarterly.

*Drovers Journal*, Vance Livestock Publications, Box 2939, Shawnee Mission, KS 66201. (913) 451-2200. Subscription fee: \$20, weekly.

*Environmental Pollution*, Elsevier Applied Science Publishers, Ltd., Crown House, Linton Road, Barking, Essex IG11 8JU, England. Subscription fee: \$284, weekly.

*EPA Journal*, Environmental Protection Agency, Office of Public Affairs, Westside Mall, 401 M Street SW, Washington, DC 20460. (919) 655-4000. Subscription fee: \$11, monthly.

*EPRI Journal*, Electrical Power Research Institute, P.O. Box 10412, 3412 Hillview Avenue, Palo Alto, CA 94303. (416) 855-2000. Subscription fee: \$20 to nonmembers, eight issues/year.

*Equus*, Fleet Street Publishing Corporation, 656 Quince Orchard Road, Gaithersburg, MD 20878. (301) 977-3900. Subscription fee: \$22.50, monthly.

*Farm Industry News*, Webb Company, 1999 Shepard Road, St. Paul, MN 55116. (612) 690-7200. Subscription fee: \$15, ten issues/year.

*Farm Journal*, Farm Journal, Inc., 230 W. Washington Square, Philadelphia, PA 19105. (215) 829-4700. Subscription fee: \$12, 14 issues/year.

*Farm Journal: Beef Extra*, Farm Journal, Inc., 230 W. Washington Square, Philadelphia, PA 19105. (215) 829-4700. Subscription fee: \$12, 14 issues/year.

*Farm Safety Review*, National Safety Council, 444 North Michigan Avenue, Chicago, IL 60611. (312) 527-4800. Quarterly.

*Farm Smart: The Journal of Computerized Farm Management*, FBS System, Inc., Drawer 248, Aledo, IL 61231. (309) 582-5628. Subscription fee: \$18, quarterly.



*Farm Cooperatives*, U.S. Department of Agriculture, Agricultural Cooperatives Service, 14th Street and Independence Avenue SW, Washington DC 20250. (202) 655-4000. Subscription fee: \$9, monthly.

*The Farmer*, Webb Publishing Company, 1999 Shepard Road, St. Paul, MN 55116. (612) 690-7200. Subscription fee: \$8, eight issues/year.

*Farmers' Digest*, Elmbrook Publications, Inc., Box 363, 2645 Maple Hill Lane, Brookfield, WI 53005. (414) 782-1570. Subscription fee: \$10, ten issues/year.

*Farmline*, U.S. Department of Agriculture, Economics Management Staff, Information Division, 1301 New York Avenue NW, Washington, DC 20005. (202) 786-1494. Subscription fee: \$14, 11 issues/year.

*FDA Consumer*, U.S. Food and Drug Administration, Office of Public Affairs, 5600 Fishers Lane, Rockville, MD 20857, (301) 443-3220. Subscription fee: \$9.50, ten issues/year.

*Feedstuffs*, Miller Publishing Company, 12400 Whitewater Drive, Suite 160, Box 2400, Minnetonka, MN 55343. Weekly.

*FFA New Horizons* (formerly *The National Future Farmer*), FFA Organization, Box 15160, Alexandria, VA 22305. (703) 360-3600. Bimonthly.

*Fine Homebuilding*, Tauton Press, Inc., 63 South Main Street, Box 355, Newtown, CT 06470. (203) 426-8171. Subscription fee: \$24, seven issues/year.

*Fine Woodworking*, Tauton Press, Inc., 63 South Main Street, Box 355, Newtown, CT 06470. (203) 426-8171. Subscription fee: \$22, bimonthly.

*Fins and Feathers*, Fins and Feathers Publishing Company, 318 West Franklin Avenue, Minneapolis, MN 55404. (612) 874-8404. Subscription fee: \$2.75, monthly.

*Fish and Wildlife Reference Service Newsletter*, Informatics General Corp., 21050 Vanowen Street, Canoga Park, CA 91303-2804. Subscription fee: free, quarterly.

*Fishing Facts*, Northwoods Publishing, Box 609, Menomonee Falls, WI 53051. (414) 255-4800. Subscription fee: \$19.97, monthly.

*Florida Nurseryman*, P.O. Box 16796, Temple Terrace, FL 33687.

*Food Technology*, Institute of Food Technologists, 221 North La Salle St., Chicago, IL 60601. (312) 782-8424. Subscription fee: \$60 to nonmembers, monthly.

*Ford New Holland News* (formerly *Sperry New Holland News*), Ford New Holland, Inc., 500 Diller Avenue, New Holland, PA 17557. (717) 354-1121. Eight issues/year.

*Forest Farmer*, Forest Farmer Association, Box 95385, Atlanta, GA 30347. (404) 325-2954. Subscription fee: \$30, ten issues/year.



*Fruit Varieties Journal*, American Pomological Society, 103 Tyson Building, University Park, PA 16802. (814) 863-2198. Subscription fee: \$12, quarterly.

*The Furrow*, Deere & Company, John Deere Road, Moline, IL 61265. (309) 765-8000. Subscription fee: free to qualified subscribers, six issues/year.

*Garden*, Horticultural Society of New York, 128 West 58th Street, New York NY 10019. (212) 757-0915. Six issues/year.

*Garden* (formerly *Garden Journal*), Garden Society, New York Botanical Garden, Bronx, NY 10458. (212) 220-8657. Subscription fee: \$12.95 to nonmembers, bimonthly.

*Good Fruit Grower*, 1005 Tieton Drive, Yakima, WA 98902. (509) 457-8188. Subscription fee: \$18, semimonthly.

*Greenhouse Grower*, Meister Publishing Co., 37841 Euclid Avenue, Willoughby, OH 44094. (216) 942-2000. Subscription fee: \$12, monthly.

*Grist*, Park Practice Program, National Recreation and Park Association, 3101 Park Center Drive, Alexandria, VA 22303. (703) 820-4940. Subscription fee: \$20, bimonthly.

*Grounds Maintenance Magazine*, Intertec Publishing Corp., 9221 Quivira Road, Box 12901, Overland Park, KS 66212. (913) 888-4664. Subscription fee: free to qualified subscribers, others \$24, monthly.

*Grower*, Vance Publishing Corp., Box 2939, Shawnee Mission, KS 66201. (913) 451-2200. Subscription fee: \$15, monthly.

*Hoard's Dairyman*, Hoard and Sons Co., 28 Milwaukee Avenue West, Fort Atkinson, WI 53548. (414) 563-5551. Subscription fee: \$10, monthly.

*Hog Farm Management*, Miller Publishing Co., 12400 Whitewater Drive, Suite 160, Box 2400, Minnetonka, MN 55343. (612) 931-0211. Subscription fee: \$18, monthly.

*Hogs Today* (formerly *Hogs Extra*), Farm Journal, Inc., 230 West Washington Square, Philadelphia, PA 19105. (215) 829-4700. Ten issues/year.

*Holstein World* (formerly *Holstein-Friesian World*), 8036 Lake Street, Box 299, Sandy Creek, NY 13145. (315) 387-3441. Subscription fee: \$19, semimonthly.

*Horse and Rider*, Rich Publishing, Inc., 941 Calle Negocio, San Clemente, CA 92672-6202. Subscription fee: \$17, monthly.

*Horse Sense*, Equine Data Systems Inc., 367 Woodlawn Road West, No. 6, Guelph, Ont. N1H 7K9, Canada. Subscription fee: \$10, bimonthly.

*Hortscience*, American Society for Horticultural Science, 701 North Saint Asaph Street, Alexandria, VA 22314-1998. Subscription fee: \$125, bimonthly.

*Horticulture*, Horticulture Associates, 755 Boylston Street, Boston, MA 02116. (617) 247-4100. Subscription fee: \$18, monthly.

*Horticulture: The Magazine of American Gardening*, 125 Garden Street, Marion, OH 43306. (617) 536-9280. Subscription fee: \$14, monthly.

*Hounds and Hunting*, Hounds and Hunting Publishing Co., Box 372, Bradford, PA 16701. (814) 368-6154. Subscription fee: \$12, monthly.

*Hydraulics and Pneumatics*, Penton Publishing, 1100 Superior Avenue, Cleveland, OH 44114. (216) 696-7000. Subscription fee: \$35, monthly.

*Implement and Tractor*, Farm Press Publications, Inc., P.O. Box 1420, Clarksdale, MS 38614. (601) 624-8503. Subscription fee: \$15, monthly.

*Industrial Education* (formerly *Industrial Arts and Vocational Education*), Cumming Publishing Co., 26011 Evergreen Road, #204, Southfield, MI 48076-4446. Subscription fee: \$20, monthly, September through May.

*In-Fisherman*, In-Fisherman, Inc., P.O. Box 999, 651 Edgewood Drive, Highway 371 North, Brainerd, MN 56401-0999. (218) 829-1648. Subscription fee: \$16.95, bimonthly.

*Interior Landscape Industry*, American Nurseryman Publishing Co., 111 North Canal Street, Suite 545, Chicago, IL 60606. (312) 782-5505. Subscription fee: \$24, monthly.

*International Harvester News*, International Harvester Company, Product Support Center, P.O. Box 4521, Oak Brook, IL 60521.

*International Wildlife*, National Wildlife Federation, Inc., 8925 Leesburg Pike, Vienna, VA 22180. Subscription fee: \$10.50, bimonthly.

*Journal of Agronomic Education*, American Society of Agronomy, Inc., 677 South Segoe Road, Madison, WI 53711. (608) 274-1212. Subscription fee: \$8, annually.

*Journal of Applied Ecology*, Blackwell Scientific Publications Ltd., Osney Mead, Oxford OX2 OEL, England. 44 865 240201. Subscription fee: \$155, three issues/year.

*Journal of Dairy Science*, American Dairy Science Association, 309 West Clark Street, Champaign, IL 61820. Subscription fee: \$75, monthly.

*Journal of Environmental Quality*, American Society of Agronomy, Inc., 677 South Segoe Road, Madison, WI 53711. (608) 274-1212. Subscription fee: \$24, quarterly.

*Journal of Range Management*, Society for Range Management, 1839 York Street, Denver, CO 80206-1213. Subscription fee: \$56, bimonthly.

*Journal of Retailing*, New York University, 202 Tisch Building, Washington Square, New York, NY 10003. (212) 998-4153. Subscription fee: \$22, quarterly.

*Journal of Small Animal Practice*, British Veterinary Association, 7 Mansfield Street, London W1M 0T, England. 01-637 0620. Subscription fee: \$220, monthly.

*Journal of Soil Science*, Blackwell Scientific Publications, Ltd., Osney Mead, Oxford OX2 OEL, England. 44 865 240201. Subscription fee: \$87, quarterly.

*Journal of Soil and Water Conservation*, Soil and Water Conservation Society, 7515 Northeast Ankeny Road, Ankeny, IA 50021. (515) 289-2331. Subscription fee: \$28, bimonthly.

*Journal of the Milking Shorthorn and Illawarra Breeds* (formerly *Milking Shorthorn Journal*), American Milking Shorthorn Society, Box 449, Beloit, WI 53511-0449. Subscription fee: \$8, monthly.

*Journal of Wildlife Management*, Wildlife Society, 5410 Grosvenor Lane, Bethesda, MD 20814. (301) 897-9770. Subscription fee: \$60, quarterly.

*Kiplinger Agriculture Letter*, Kiplinger Washington Editors, Inc., 1729 H Street NW, Washington, DC 20006. (202) 887-6400. Subscription fee: \$42, fortnightly.

*Lead*, Lead Industries Association, Inc., 292 Madison Avenue, New York, NY 10017. (212) 578-4750. Subscription fee: free, semiannual.

*Meat and Poultry*, Oman Publishing, Inc., 90 Throckmorton Avenue, Box 1059, Mill Valley, CA 94942. (415) 388-4050. Subscription fee: \$40, monthly.

*Meat Plant Manager*, Admore Publishing Co., Inc., 9701 Gravois Street, St. Louis, MO 63123. (314) 638-4050. Subscription fee: \$15, monthly.

*Minnesota Horticulturist*, Minnesota State Horticultural Society, 161 Alderman Hall, University of Minnesota, St. Paul, MN 55108. (612) 624-3281. Subscription fee: \$15, nine issues/year.

*Modern Horse Breeding*, Fleet Street Publishing Corporation, 656 Quince Orchard Road, Gaithersburg, MD 20878. (301) 977-3900. Subscription fee: \$39.95, ten issues/year.

*Mother Earth News*, Mother Earth News, Inc., 80 Fifth Avenue, New York, NY 10011. (212) 242-2460. Subscription fee: \$18, bimonthly.

*National Geographic*, National Geographic Society, 17th and M Streets NW, Washington, DC 20036. (202) 857-7000. Subscription fee: \$19.50, monthly.

*National Parks* (formerly *National Parks and Conservation Magazine*), National Parks and Conservation Association, 1015 31st Street NW, Washington, DC 20007. (202) 944-8530. Subscription fee: \$22, bimonthly.

*National Provisioner*, National Provisioner, Inc., 15 West Huron Street, Chicago, IL 60610. (312) 944-3380. Subscription fee: \$14, weekly.

*National Wildlife*, National Wildlife Federation, Inc. 1412 16th Street NW, Washington, DC 20036. (202) 797-6800. Subscription fee: \$15, bimonthly.

*Natural Gas Monthly* (formerly *Natural Gas*), U.S. Energy Information Administration, Forrestal Building, Washington, DC 20585. (202) 252-8800. Subscription fee: \$56, monthly.

*Nature Conservancy Magazine*, Nature Conservancy, 1800 North Kent Street, Suite 800, Arlington, VA 22209. (703) 841-5300. Membership required, monthly.

*North America Fruit Explorers*, North American Fruit Explorers, Inc., Route 1, Box 94, Chapin, IL 62628.

*Northern Sun News*, Northern Sun Alliance, 1519 East Franklin Avenue, Minneapolis, MN 55404. (612) 874-1540. Subscription fee: \$15, ten issues/year.

*Nursery Manager*, Branch-Smith, Inc., 120 St. Louis Street, Ft. Worth, TX 76104. (817) 332-8236. Subscription fee: \$24, monthly.

*Outdoor Recreation*, Nystrom Publishing Company, Inc., 9100 Cottonwood Lane, Maple Grove, MN 55369. (612) 221-0596. Subscription fee: \$6.95, bimonthly.

*Pacific Coast Nurseryman and Garden Supply Dealer*, Cox Publishing Company, 306 West Foothill Boulevard, Box 1477, Glendora, CA 91740. (818) 914-3916. Subscription fee: \$15, monthly.

*Packer*, Vance Publishing Corp., Box 2939, Shawnee Mission, KS 66201. (913) 451-2200. Subscription fee: \$40, weekly.

*Pest Control Technology*, G.I.E., Inc., Publishers, 4012 Bridge Avenue, Cleveland, OH 44113. (216) 961-4130. Subscription fee: \$22, monthly.

*Pesticide and Toxic Chemical News*, Food Chemical News, Inc., 1101 Pennsylvania Avenue SE, Washington, DC 20003. (202) 554-1980. Subscription fee: \$530, weekly.

*Plants & Gardens: Brooklyn Botanic Garden Record* (formerly *Plants and Gardens*), Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, NY 11225. (718) 622-4433. Subscription fee: \$20, quarterly.

*Pomona*, North American Fruit Explorers, Rte. 1, Box 94, Chapin, IL 62628. Subscription fee: available only to members, four issues/year.

*PC Magazine*, Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016. (212) 503-5100. Subscription fee: \$34.97, biweekly.

*Popular Science*, Times Mirror Magazines, Inc., 380 Madison Avenue, New York, NY 10017. (212) 687-3000. Subscription fee: \$13.94, monthly.

*Pork Roundup*, Kent Feeds, Inc., 1600 Oregon Street, Muscatine, IA 52761. (319) 264-4211. Subscription fee: free, annually.

*Power Engineering*, PennWell Publishing Company, 1421 Sheridan Road, Tulsa, OK 74112. (918) 385-3161. Subscription fee: \$24, monthly.

*Pure-Bred Dogs*, American Kennel Gazette, American Kennel Club, Inc., 51 Madison Avenue, New York, NY 10010. (212) 696-8331. Subscription fee: \$18, monthly.

*Quick Frozen Foods International*, E.W. Williams Publications Company, 80 Eighth Avenue, New York, NY 10011. (212) 989-1101. Subscription fee: \$15, quarterly.

*RE Magazine* (formerly *Rural Electrification Magazine*), National Rural Electric Cooperative Association, 1800 Massachusetts Avenue NW, Washington, DC 20036. (202) 857-9500. Subscription fee: \$11, monthly.

*Rodale's Organic Gardening*, Rodale Press, Inc., 22 East Minor Street, Emmaus, PA 18049. (215) 967-5171. Subscription fee: \$12.97, monthly.

*Sales and Marketing Management*, Bill Communications, Inc., 633 Third Avenue, New York, NY 10017. (212) 986-4800. Subscription fee: \$38, 16 issues/year.

*Sales Management*, I.S.E. Publications Ltd., Georgian House, 31 Upper George Street, Luton, Beds. LU1 2RD, England. Membership required, monthly.

*Select Sires*, "Selections," 11740 U.S. Highway 42, Plain City, OH 43064. (614) 873-4683. Subscription fee: free, bimonthly.

*Sheep Breeder and Sheepman*, Mead Livestock Services, Box 796, Columbia, MO 65201. (314) 442-8257. Subscription fee: \$15, monthly.

*Sierra*, Sierra Club, 730 Polk Street, San Francisco, CA 94109. (415) 776-2211. Subscription fee: \$12, bimonthly.

*Soil and Water Conservation News*, U.S. Conservation Service, U.S. Department of Agriculture, Box 2890, Washington, DC 20013. (202) 447-4567. Subscription fee: \$8.50, monthly.

*Soil Science Society of America Journal*, Soil Science Society of America, 677 South Segoe Road, Madison, WI 53711. (608) 273-8080. Subscription fee: \$65, bimonthly.

*Solar Utilization News*, Solar Utilization Network, 121 Chestnut Street, Philadelphia, PA 19106. Subscription fee: \$175, quarterly.

*Southern Florist and Nurseryman*, Branch-Smith, Inc., 120 St. Louis Avenue, Fort Worth, TX 76104. (817) 332-8236. Subscription fee: \$24, monthly.

*Southern Golf-Landscape & Resort Management* (formerly *Landscape and Turf*), Brantwood Publications, Inc., Northwood Plaza Station, Clearwater, FL 33519-0360. (813) 796-3877. Subscription fee: \$9, bimonthly.

*Soybean Digest*, American Soybean Association, 777 Craig Road, Box 41309, St. Louis, MO 63141-1309. (314) 432-1600. Subscription fee: \$20, monthly.

*Speedy Bee*, Fore's Honey Farms, Inc., Box 998, Jeup, GA 31545. Subscription fee: \$11.25, monthly.

*Successful Farming*, Meredith Corporation, 1716 Locust Street, Des Moines, IA 50319. (515) 284-3231. 13 issues/year.

*Successful Farming: Farm Computer News*, Meredith Corporation, 1716 Locust Street, Des Moines, IA (515) 284-3231. Subscription fee: \$10, monthly.

*Sunflower*, National Sunflower Association, 4023 North State Street, Bismarck, ND 58501. (701) 224-3019. Subscription fee: \$9, five issues/year.

*Telemarketing*, Technology Marketing Corporation, One Technology Plaza, Norwalk, CT 06854. (203) 852-6800. Subscription fee: \$49, monthly.

*Telemarketing Update*, Update Publicare Co., c/o Prosperity and Profits Unlimited, Distribution Services, Box 570213, Houston, TX 77257-0213. Subscription fee: \$4, semiannual.

*Veterinary Medicine*, Veterinary Medicine Publishing Company, 9073 Lenexa Drive, Lenexa, KS 66215. (913) 492-4300. Subscription fee: \$38.95, monthly.

*Vision* (formerly *Keep America Beautiful*), Keep American Beautiful, Inc., Mill River Plaza, 9 West Broad Street, Stanford, CT 06902-3734. (203) 323-8987.

*Wall Street Journal*, Dow Jones & Company, Inc., 200 Liberty Street, New York NY 10007. (212) 285-5000. Subscription fee: \$101, five issues/week.

*Water Farming Journal*, Carroll Trosclair and Associates, Inc., 3400 Neyrey Drive, Metairie, LA 70002. Subscription fee: \$18, monthly.

*Water Pollution Control Federation Journal*, Water Pollution Control Federation, 601 Wythe Street, Alexandria, VA 22314-1994. Subscription fee: \$144, monthly.

*Water Resources Research*, American Geophysical Union, 2000 Florida Avenue NW, Washington, DC 20009. (202) 462-6903. Subscription fee: \$375, monthly.

*Welding-Brazing-Soldering Digest*, ASM International, Materials Information, Metals Park, OH 44073. (216) 338-5151. Subscription fee: \$120 to nonmembers, monthly.

*Welding Design and Fabrication*, Penton Publishing, 1100 Superior Avenue, Cleveland, OH 44114. (216) 696-7000. Subscription fee: \$35, monthly.

*Welding Engineer*, Penton Publishing, 1100 Superior Avenue, Cleveland, OH 44114. (216) 696-7000. Subscription fee: \$35, monthly.

*Welding Journal*, American Welding Society, Box 351040, Miami, FL 33125. (305) 443-9353. Subscription fee: \$30, monthly.

*Western Horseman*, Western Horseman, Inc., 3850 North Nevada Avenue, Box 7890, Colorado Springs, CO 80933. (303) 633-5524. Subscription fee: \$15, monthly.

*Wind Technology Journal*, American Wind Energy Association, Box 5659, Norman, OK 73070. Quarterly.

*Windpower Digest*, Wind Power Publishing, Box 700, Gascon, OH 44809. (419) 937-2299. Subscription fee: \$12, quarterly.



*Wisconsin Agriculturalist*, Wisconsin Farmer Company, Inc., Box 4420, Madison, WI 53711. (608) 274-9400. Subscription fee: \$9; monthly May through December, semimonthly January through April.

*Wisconsin Cooperative Pest Survey Bulletin*, Agriculture Research Management Division, Plant Industry Bureau, 801 West Badger Road, P.O. Box 8911, Madison, WI 53708. Bimonthly.

*Wisconsin Dairy Data*, Wisconsin Milk Marketing Board, Inc., 4337 West Beltline Highway, Madison, WI 53711. (800) 426-9662. Quarterly.

*Wisconsin Forager*, Wisconsin Forage Council, 353 Moore Hall, 1575 Linden Drive, Madison, WI 53706.

*Wisconsin Natural Resources*, Department of Natural Resources, Box 7921, Madison, WI 53707. (608) 266-1510. Subscription fee: \$6.97, bimonthly.

*Wisconsin Pest Manager*, Attn: P.A.T., Department of Agronomy, 1575 Linden Drive, University of Wisconsin-Madison, Madison, WI 53706. (608) 262-7588. Subscription fee: \$12, monthly. Make checks payable to: University of Wisconsin-Extension.

*Wisconsin Sportsman*, Game & Fish Publications, Box 741, Marietta, GA 20061-0741. (404) 953-9222. Subscription fee: \$11.95, monthly.